

入札説明書
【電子入札システム対象案件】

2023年9月6日
独立行政法人国際協力機構

独立行政法人国際協力機構の「ウクライナ国公共放送組織体制強化プロジェクト フェーズ2向け機材（中継車）」の調達に係る入札公告に基づく入札等については、当機構契約事務取扱細則（平成15年細則（調）第8号。以下「細則」という。）に定めるもののほか、この入札説明書によるものとします。

本業務の入札は電子入札システムで実施し、提出書類の授受等入札手続きは電子入札システム経由となります。提出書類のメール送付、郵送及び持参は原則不可とさせていただきます。

1 公告日

2023年9月6日

2 契約担当役 理事

3 競争入札に付する事項

- ・ 件名：ウクライナ国公共放送組織体制強化プロジェクト フェーズ2向け機材（中継車）
- ・ 主要調達機材名及び仕様（詳細は機材仕様明細書を参照）：

中継車

- (1) 取引条件：出荷国倉庫指定場所渡し
- (2) 船積（空）港：出荷国国際港（納入場所は発注者の手配による）
- (3) 仕向（空）港：ウクライナ国リビウ市
- (4) 引渡期限：10カメラ搭載中継車：2024年6月8日
6カメラ搭載中継車：2024年11月15日
- (5) 業務完了期限：2024年12月6日

4 担当部署等

(1) 担当部署

郵便番号102-8012
東京都千代田区二番町5番地25 二番町センタービル
独立行政法人国際協力機構
調達・派遣業務部契約第三課（機材調達班）
TEL：03-5226-6643
メール：e_sanka@jica.go.jp

(2) 書類の提出、授受方法

電子入札システム上で行います。

【電子入札システムポータルサイト】

<https://www.jica.go.jp/announce/notice/ebidding.html>

5 競争参加資格

(1) 消極的資格制限

以下のいずれかに該当する者は、当機構の契約事務取扱細則（平成15年細則（調）第8号）第4条に基づき、競争参加資格を認めません。

- 1) 契約を締結する能力を有しない者又は破産者で復権を得ない者
具体的には、会社更生法（平成14年法律第154号）または民事再生法（平成11年法律第225号）の適用の申立てを行い、更生計画または再生計画が発効していない法人を言います。
- 2) 当機構から「独立行政法人国際協力機構が行う契約における不正行為等に対する措置規程」（平成20年規程（調）第42号）に基づく契約競争参加資格停止措置を受けている者
具体的には、以下のとおり取扱います。

- ア. 競争参加資格確認申請書の提出期限日において上記規程に基づく資格停止期間中の場合、本入札には参加できません。
- イ. 資格停止期間前に本入札への競争参加資格確認審査に合格した場合でも、入札執行時点において資格停止期間となる場合は、本入札には参加できません。
- ウ. 資格停止期間前に落札している場合は、当該落札者との契約手続きを進めます。
- 3) 独立行政法人国際協力機構反社会的勢力への対応に関する規程（平成24年規程(総)第25号）第2条第1項の各号に掲げる者
具体的には、反社会的勢力、暴力団、暴力団員、暴力団員等、暴力団準構成員、暴力団関係企業、総会屋等、社会運動等標ぼうゴロ、特殊知能暴力集団等を指します。
- 4) 次の各号の一に該当すると認められる者であって、その事実があった後2年を経過しない者
 - ア. 契約の履行にあたり故意に工事若しくは製造を粗雑にし、又は物件の品質若しくは数量に関して不正の行為をした者
 - イ. 公正な競争の執行を妨げた者又は公正な価格を害し若しくは不正な利益を得るために連合した者
 - ウ. 落札者が契約を結ぶこと又は契約者が契約を履行することを妨げた者
 - エ. 監督又は検査の実施にあたり職員の職務の執行を妨げた者
 - オ. 正当な理由がなくして契約を履行しなかった者
 - カ. 前各号の一に該当する事実があった後2年を経過しない者を、契約の履行にあたり、代理人、支配人その他の使用人として使用した者

(2) 積極的資格制限

当機構の契約事務取扱細則第5条に基づき、以下の資格要件を追加して定めます。

- 1) 公告日において、令和04・05・06年度全省庁統一資格にて「物品の製造」又は「物品の販売」の格付けを有する者（等級は問わない）
- 2) 日本国登記法人
日本国で施行されている法令に基づき登記されている法人であること
- 3) 輸出実績を有する者

6 競争参加資格確認の申請

- (1) 本競争の参加希望者は、電子入札システムの「競争参加資格確認申請書」画面より全省庁統一資格審査結果通知書(写)をPDFで添付して提出してください。同システムを介して発注者から書類の授受の確認及び競争参加資格の有無について確認通知を受けなければなりません。
なお、下記の締切日時までに必要書類を提出しない者及び競争参加資格がないと通知された者は、競争に参加することができません。

ア. 競争参加資格申請書受付開始日時： 2023年9月7日正午

イ. 競争参加資格申請書受付締切日時： 2023年10月3日正午

ウ. 提出書類：
令和04・05・06年度審査結果通知書(全省庁統一資格) 写し

- (2) 競争参加資格の確認結果は2023年10月5日までに電子入札システムにより通知します。結果が期日までに通知されない場合は、上記4. にお問い合わせください。

(3) その他

- ア. 発注者は、提出された申請書を、本件の競争参加資格の確認以外に申請者に無断で使用することはありません。
- イ. 申請書に関する問い合わせ先は、上記4. を参照ください。

7 競争参加資格がないと通知された者に対する理由の説明

- (1) 当機構より競争参加資格がないと認められた者は、その理由について、書面（様式は任意）により説明を求めることができます。
 - ア. 提出期限：2023年10月10日正午
 - イ. 提出場所：上記4. 参照
 - ウ. 提出方法：メール
- (2) 機構は、説明を求めた者に対し、2023年10月12日までに書面（PDF）によりメールにて回答します。

8 本件入札に関する質問

- (1) 機材仕様明細書の内容等、この入札案件に関する質問がある場合は、次に従い所定の様式により提出してください。
 - ア. 質問受付期限：2023年9月21日正午
 - イ. 提出方法：当方での取りまとめの都合上、メールでのご提出をお願いいたします。当機構よりメールを受信した旨の返信メールをお送りします。
送付先：e_sanka@jica.go.jp
メールタイトル：【入札説明書への質問（社名●●）】23a00397：ウクライナ国公共放送組織体制強化プロジェクト フェーズ2向け機材（中継車）
 - ウ. 注意：質問受付期限を過ぎてから届いた質問及び口頭による質問に対してはお答えできませんのであらかじめ了承願います。
本件については、機材仕様明細書に参考銘柄として記載しているもの以外のものを提案したい場合は、必ず提出期間内にその銘柄のカタログを添付して採用の可否につきメールで質問してください。
- (2) 質問に対する回答は、次の日時に掲示します。
 - ア. 2023年9月27日以降
 - イ. 質問回答は、掲載後に追加されて再掲載することがありますので、入札書提出までに必ず確認してください。
 - ウ. 質問を受け確認したことによって、仕様・数量等が変更されることがあります。また、質問がない場合にも訂正が生じることがあります。いずれも「質問回答」欄に掲載しますので、本件競争参加希望者は、質問提出の有無にかかわらず、必ずご確認ください。入札金額は、掲載した全ての回答・訂正が反映されたものと見なされます。

9 辞退書の提出

- (1) 競争参加資格の確認を受けた者が競争参加を辞退するときは、電子入札システム「辞退書_提出」ボタンから辞退届を提出することとなっています。
辞退書提出期限：入札書受付締切予定日時まで
- (2) (1)の手続きにより競争参加を辞退した者は、これを理由として以後の資格の確認等について不利益な取扱いを受けるものではありません。
- (3) その他
 - ア. 提出期限以降における辞退書の取り消しは認めません。
 - イ. 辞退書に関する問い合わせ先は、上記4. 参照。

10 技師派遣費用参考見積の提出

技師派遣費用の参考見積に関して、次に従い任意の様式により提出してください。

- ア. 提出期限：2023年10月16日正午（入札書受付締切日時）
- イ. 提出方法：当方での取りまとめの都合上、メールでのご提出をお願いいたします。当機構よりメールを受信した旨の返信メールをお送りします。
送付先：e_sanka@jica.go.jp
メールタイトル：【技師派遣費用の参考見積（社名●●）】23a00397：ウクライナ国公共放送組織体制強化プロジェクト フェーズ2向け機材（中継車）

ウ. 注意：質問受付期限を過ぎてから届いた質問及び口頭による質問に対してはお答えできません

11 入札執行（入札）の日時

本入札において、再入札の可能性もあるため、入札者は開札予定日時に電子入札システムを操作できる場所で待機願います。再入札については、発注者から再入札実施日時を通知しますので、指定時間中に再入札書を電子入札で提出願います。

また、時間内に再入札もしくは辞退の意思表示がなされない場合には失格となります。

- (1) 入札書受付開始日時：2023年10月3日正午
- (2) 入札書受付締切日時：2023年10月16日正午
- (3) 開札日時：2023年10月17日午後3時
- (4) 再入札の場合は、発注者からのメール及び電子入札システムにより再入札の指示以降、上記同様に再入札書受付開始/締切及び開札予定日時を電子入札システムで確認した上で再入札書を提出して下さい。

1.2 入札者の失格

入札書受付締切予定日時までに入札書を提出しなかった場合（再入札時の場合も含む）には入札者を失格とします（受注者側のPCのトラブルによる場合も含む）。

その他入札執行者の指示に従わなかったときも失格とします。

1.3 入札方法等

- (1) 電子入札システムで入札を行います。
- (2) 以下の費用を含んだ総価（円）をもって入札金額とします。ただし、輸入通関は相手国政府の責任と費用負担で行います。
 - ア. 機材仕様明細書に示される全品目に対する機材代金
 - イ. 梱包条件書に基づく輸出梱包にかかる費用
- (3) 本件は、国内取引であり、契約金額は課税対象です。
- (4) 一旦提出した入札書は、引換、変更又は取消することができません。
- (5) 海外向け機材調達にかかる各種手続きは、「JICA海外向け機材調達の手引き（高額機材）」に記載しています。本入札で使用する所定の入札書式及び一般的な配慮事項等が含まれていますので、入札に参加する方は予め内容をご確認のうえ入札してください。同手引は次のURLからダウンロードできます。
https://www.jica.go.jp/announce/manual/form/oversea/ku57pq00000qsp1h-att/i201702_tebik.pdf
- (6) 入札保証金は免除します。
- (7) 技師派遣費用について、本件の入札金額に含みませんが、技師派遣条件書に記載の業務遂行に当たって必要な金額を参考見積として、上記「10 技師派遣費用の参考見積の提出」に従って、ご提出ください。

1.4 入札の無効

次の各号のいずれかに該当する入札は無効とします。

- (1) 競争に参加する資格を有しない者のした入札
- (2) 入札書締切日時後に到着した入札
- (3) 明らかに連合によると認められる入札
- (4) 同一入札者による複数の入札
- (5) その他入札に関する条件に違反した入札
- (6) 条件が付されている入札

1.5 落札者の決定方法

- (1) 発注者の予定価格の範囲内で最低の価格をもって入札した者を落札者とします。
- (2) 落札となるべき同価の入札をした者が2者以上あるときは、電子入札システムの電子くじにより落札者を決定します。

1.6 入札手順等開札までに行うべきこと

- (1) 入札の手順
 - 1) 開札までに行うべきこと
入札者は電子入札システムにより入札書締切日時までに入札金額を入力・提出します。
 - 2) 開札
入札執行者は、開札時刻に電子入札システムにより開札し、入札結果をシステム上で入札者に開示します。

3) 再入札及び不落随意契約交渉

ア. 開札後、再入札が発生した際には入札者は電子入札システムにより再入札通知書に記載の入札書受付/締切日時、開札日時及び入札最低金額に従って、再入札書を提出します。入札者は開札日時以降、入札結果を確認できるようPCの前で待機するようにお願いします。

イ. 開札の結果、すべての入札金額が予定価格を超える場合には、ただちに2回目の再入札を行います。再入札を2回行っても落札者がいないときは、入札を打ち切り、入札金額の最も低いものから、順次不落随意契約の交渉を行う場合があります。
なお、1回目もしくは2回目の再入札が応札者全員の辞退による不調に終わった場合には、その前の入札における入札金額の最も低いものから、順次不落随意契約の交渉を行うことがあります。
また、上記経緯による不落随意契約の交渉が不調であった場合には、再入札を辞退した者との間でも不落随意契約交渉を行う場合があります。

(2) 入札途中での辞退

「不調」の結果に伴い、再入札を辞退する場合は、「辞退」表示を選択して辞退届を提出して下さい。

(3) 落札者と宣言された者の失格

落札者と宣言された者について、入札金額が著しく低い等、当該応札者と契約を締結することが公正な取引の秩序を乱すこととなるおそれがある著しく不相当であると認められる場合には当該落札者を失格とし、改めて落札者を決定する場合があります。

1 7 内訳明細書の提出、契約書作成及び締結

(1) 落札者は、入札日の翌日から起算して7営業日以内に内訳明細書を提出してください。7営業日以内に内訳明細書の提出がない場合には、当該落札者を失格とするもあります。

(2) 当機構における内訳明細書の確認及び内部手続きの完了後、契約相手と決定された者は電子契約書による契約に同意するものとみなし、当機構が契約書(案)を雛型に基づき作成し、電子署名により締結します。(契約書の日付は、内訳明細書の確認及び当機構の内部決裁が完了後に当機構が指定します。)

なお、書面による契約を希望する場合は、落札後発注者へご照会ください。電子契約書の導入については次のURLをご参照ください。

https://www.jica.go.jp/announce/information/20221021_02.html

ア. 電子契約書を利用して契約締結する場合

本契約の証として、本書を電磁的に作成し、発注者、受注者それぞれ合意を証する電磁的措置を執ったうえ、双方保管するものとする。なお、本契約は、以下の日付より効力を生じるものとする。

イ. 従来の紙で作成された契約書にて契約締結する場合

本契約の証として、本書2通を作成し、発注者、受注者記名押印のうえ、各自1通を保持する。

(3) 契約保証金は免除します。

1 8 契約締結後の提出書類

(1) 受注者は、危険品及び温度管理品について、契約締結後30日以内にその有無を所定の様式により当機構に提出するものとします。

(2) 受注者は、検疫、梱包材の燻蒸証明取り付け、原産地証明、領事査証等、その他各種許可承認の手続きが必要な場合、受注者の責任において行ってください。

(3) 薬品を調達する場合は、受注者は、納品予定日の7営業日前までに、その有効期限を所定の様式により当機構に提出するものとします。

(4) 危険品があるときは、受注者は、契約締結後30日以内に、安全データシートを当機構に提出するものとします。

19 安全保障輸出管理

- (1) 受注者は、その責任において、全品目について、外国為替及び外国貿易法（昭和24年法律第228号）、輸出貿易管理令（昭和24年政令第378号）、その他の輸出関連法規及び米国輸出規則（以下、まとめて「輸出規制法規」という。）による輸出規制該当品の有無を確認し、契約締結から30日以内にその結果を所定の様式により当機構に提出するものとします。
- (2) 受注者は、輸出規制法規による該非の判定に必要な資料（項目別対比表、パラメーターシート、米国輸出規則の輸出規制品目分類番号（ECCN）等）を、契約締結後30日以内に当機構に提出するものとします。
- (3) 輸出規制法規による輸出許可・承認の取り付けが必要な場合は、受注者が輸出許可・承認を申請するものとします。当機構は、当該物品の許可・承認に必要な情報のうち当機構が保有する情報を受注者に提供します。
- (4) 当該物品の許可・承認の取得が不可能であると判断される場合には、当該物品及び同物品の使用に不可欠な附属物品の発注を取り止め、当該物品の契約を解除します。

20 留意事項

- (1) 応募者は、「JICA海外向け機材調達の手引き（高額機材）」、機材調達契約約款、契約書案、機材仕様明細書他附属書類を十分理解してから参加するものとします。
- (2) 委任状等に虚偽の記載をした場合においては、措置規程に基づき措置を行うことがあります。
- (3) 落札者が独占禁止法あるいは刑法に定める談合等不正行為を犯し、行政処分または刑が確定したときは、落札者は談合等不正行為にかかる違約金として契約金額の100分の10を当機構へ支払うものとします。また、この場合当機構は当該落札者とは契約を締結しません。もし契約締結後にかかる状況になった場合は、当機構は、契約書に基づき、同上の違約金を徴取するとともに、該当契約を解除します。
- (4) 正当な理由なくして次の各状況に該当する場合は、次回以降の入札参加をお断りする場合があります。
 - ア. 全品目の梱包才数、危険品及び温度管理品の有無、輸出規制法規による規制該当品の有無について所定の期日までに提出がない場合
 - イ. 危険品及び温度管理品の有無、輸出規制法規による規制該当品の有無、薬品の有効期限の判定に誤りがあった場合
 - ウ. 全品目の梱包才数にその後の確定時と比べ大きな誤差があった場合
 - エ. その他関連業務が粗雑あるいは不誠実と認められる場合
- (5) ウクライナ国での調達車両の登録等に必要である、Declaration of Conformity（以下DoC）の取得は受注者の責任と費用負担の元実施すること。

21 情報の公表について

「独立行政法人の事務・事業の見直しの基本方針」（平成22年12月7日閣議決定）において、独立行政法人の役職員経験者の契約相手方への再就職の情報や当該法人との間の取引等の情報を公表することとされたことに伴い、JICAでも同情報の公表を行っています。つきましては、当機構においてもこれに基づき関連情報を当機構ホームページで公表することとしますので、必要な情報の当方への提供及び情報の公表に同意の上で、競争に参加していただくようご理解とご協力をお願いいたします。なお、契約の締結をもって、本件公表に同意されたものとみなさせていただきます。

- (1) 公表の対象となる契約
財産の買入れの場合、160万円を超える契約
- (2) 公表の対象となる契約相手方
次のいずれにも該当する契約相手方
 - ア. 当該契約の締結日において、当機構の役員経験者が再就職していること又は当機構の課長相当職以上経験者が役員等として再就職していること
(注) 役員等とは、役員のほか、相談役、顧問その他いかなる名称を有する者であるかを問わず、経営や業務運営について、助言することなどにより影響力を与え得ると認められる者を含む。
 - イ. 当機構との間の取引高が、総売上又は事業収入の3分の1以上を占めていること

- (3) 公表する情報
契約ごとに、物品役務の名称及び数量、契約締結日、契約相手方の氏名・住所、契約金額等と併せ、次に掲げる情報を公表します。
- ア. 当機構の役員経験者又は当該契約相手方の役員等として再就職している当機構課長相当職以上経験者の氏名、契約相手方での現在の職名及び当機構における最終職名
 - イ. 契約相手方の直近3カ年の財務諸表における当機構との間の取引高
 - ウ. 契約相手方の総売上高又は事業収入に占める当機構との間の取引割合が、次の区分のいずれかに該当する旨
 - ・ 3分の1以上2分の1未満
 - ・ 2分の1以上3分の2未満
 - ・ 3分の2以上
 - エ. 一者応札又は応募である場合はその旨
- (4) 当機構の役職員経験者の有無の確認日：当該契約の締結日とします。
- (5) 情報提供の方法
契約締結時に所定の様式を提出していただきますので、ご協力をお願いします。
詳細は、次のページをご参照ください。
<https://www.jica.go.jp/announce/manual/guideline/consultant/corporate.html>

以上

様式集

<参考様式>

【入札手続に関する様式】

質問様式

【契約締結に関する様式】

- 最終見積書
- 内訳明細書（機材仕様明細書）
- 契約書 船積渡し/仕向地渡し
- 機材調達契約約款
- 梱包条件書
- 輸送条件書 船積渡し/仕向地渡し

【契約締結後の提出書類】

- 支払先口座届出書
- 輸出貿易管理令等調書
- 外国製品に関する調書
- 危険品・温度管理品の確認について
- 仕様変更届 受注者文書
- 仕様変更届 製造会社文書
- 検査願書
- 輸送書類提出様式・受領書
- 輸送日程報告カード

以上の様式のデータは、国際協力機構ホームページ「調達情報」→「調達ガイドライン、様式」→「様式」「海外向け資機材の調達」「一般競争入札」よりダウンロードできます。

https://www.jica.go.jp/announce/manual/form/oversea/op_tend.html

なお、宛名に理事名、件名、公告番号、公告日、入札日を記載する様式には、以下の通り記載してください。

- ・ 宛名：独立行政法人国際協力機構 契約担当役 理事
- ・ 件名：ウクライナ国公共放送組織体制強化プロジェクト フェーズ2向け機材（中継車）
- ・ 公告番号：23a00397
- ・ 公告日：2023年9月6日
- ・ 入札日：2023年10月17日

機材仕様明細書 総則

番号	機材名	仕様
0	総則	(総則)
0.1	General	<p>1. 中継車の全ての装備、機器および材料は、新品で、未使用のものでなければならない。</p> <p>2. 受託事業者は、中継車がヨーロッパにおいて、下記の法令の要件に従って使用できることを確保する責任を有する。</p> <p>法令名：</p> <ul style="list-style-type: none"> ◆ Regulation (EU) 2019/2144 of the European Parliament and of the Council of 27 November 2019 on type-approval requirements for motor vehicles and their trailers, and systems <p>3. 中継車は、ウクライナ国内で使用する車両の下記の国内規制要件を満たすこと。</p> <p>法令・規制名：</p> <ul style="list-style-type: none"> ◆ Law of Ukraine No. 2344-14 on road transport ◆ Traffic rules. Section 31 regarding technical condition of road transport and it' s equipment ◆ Law of Ukraine, document 2739-IV regarding customs regulations, registration, eco standards <p>なお、上記2, 3に記載していない法令、規則等を含めた、DoC 取得等仕向地での走行に必要な諸手続きについても、受注者の責任において対応すること。</p> <p>4. 10カメラ搭載中継車は、MAN TGS26.320_6x2 BL等の大型車をベースとして製造すること。</p> <p>5. 6カメラ搭載小型中継車は、IVECO Daily、メルセデスベンツ Sprinter、フォルクスワーゲン Transport等の小型商用車をベースとして製造すること。</p> <p>6. 仕様欄において記載の機材寸法及び重量は、その数値を中心として、±10%以内の範囲を認める。ただし、車両に搭載する際に車体及び搭載機器と一つのシステムとして機能すること。</p> <p>7. メーカー設定の標準付属品は、仕様欄に記載がなくとも当該機材の付属品として含めること。</p>
0.2	製造事業者の要件	<p>1. 中継車を製造し、ウクライナ公共放送局に対する義務（製造、研修、整備等を含む）を履行するための全ての業務は、単一の中継車製造事業者によって提供されること。</p> <p>2. 中継車製造事業者は、ウクライナ国内に直営事務所およびサービスセン</p>

機材仕様明細書 総則

		<p>ターを有していること。ウクライナ公共放送局からの問い合わせに対する回答、現場での相談、運用上の支援などを含め、ウクライナ公共放送局に対するサービスの連絡や交渉は、すべてウクライナ語で行うこと。</p> <p>中継車製造事業者のウクライナ国内の直営事務所およびサービスセンターについて、所在地住所、担当者名、電話番号、Eメールアドレスを明記したリストを提出すること。</p> <p>3. 中継車製造事業者は、ウクライナ公共放送局への中継車の整備サービスを直接行うこととし、第三者に委託してはならない。</p> <p>4. 中継車製造事業者は、下請け事業者を用いずに、中継車製造の全ての工程を完遂した実績と能力を有していること。</p>
0.3	完成図書	<p>中継車の引渡し時に、シャーシ、ボディ架装、油圧システム、空調、主電源および低電圧システム、警報装置など、車両および全ての付属システムに関する操作およびメンテナンスマニュアル、据え付け図、ビデオ回路図、オーディオ回路図、映像・音声コントロールシステム図、電気回路図一式、Factory Inspection Record を完成図書としてウクライナ公共放送局に提出すること。</p> <p>なお、Factory Inspection Record は発注者へ併せて提出すること。</p>
0.4	Factory Inspection	<p>中継車の工場出荷に際して Factory Inspection を実施し、Factory Inspection Record を提出すること。</p> <p>なお、Factory Inspection に対し発注者から受注者に対し、検査結果の通知は行わない。</p> <ul style="list-style-type: none"> ・ 検査項目：機材仕様明細書記載の仕様の確認 ・ 検査方法：機材の動作チェック及び測定器による実測・データ取得 ・ 実施場所：メーカー工場 ・ 立会人：メーカー、受注者、コンサルタント ・ 検査記録の提出時期：仕向地納入前検査時 ・ 検査記録の提出先：ウクライナ公共放送局及び発注者
0.5	仕向地納入前検査	<p>機材を仕向地まで輸送した後、仕向地納入前検査を実施し、立会検査員が立会検査記録を作成、発注者へ提出すること。本検査はオンラインでの実施を可とする。</p> <p>提出された立会検査記録の内容を検査し、発注者は受注者へ検査結果を通知する。合格となった場合、受注者は機材費及び梱包・輸送費の9割を発注者に請求できる。</p> <ul style="list-style-type: none"> ・ 検査項目：員数、外観、仕様が契約内容に適合していることの確認、輸送中の損傷の有無

機材仕様明細書 総則

		<ul style="list-style-type: none"> ・実施場所：輸送条件書に記載の仕向地 ・立会検査員：受注者、発注者及びウクライナ公共放送局担当者 ・作成書類：立会検査記録 <p>なお、詳細仕様の確認には、Factory Inspection Recordを使用する。</p>
0.6	保証期間	車両および装備の保証期間は、中継車がウクライナ公共放送局に引き渡されてから1年間とする。
0.7	寸法	<ol style="list-style-type: none"> 1. 10カメラ搭載中継車の外形寸法は、以下の数値とする。 <ul style="list-style-type: none"> ◆ 全長12メートル以内 ◆ 全高4メートル以内 ◆ 運転時に全幅が2.55メートルを超えないこと 2. 6カメラ搭載小型中継車の外形寸法は、概ね以下の数値とする。 <ul style="list-style-type: none"> ◆ 全長7.7メートル、全高3.5メートル、全幅2.4メートル
0.8	ベース車両（10カメラ搭載中継車）	<ol style="list-style-type: none"> 1. 10カメラ搭載大型中継車のベース車両は以下の仕様を満たすこと。 <ul style="list-style-type: none"> ◆ シャーシタイプ、220馬力以上、ホイールベース約5.5～5.9メートル ◆ 排ガスクラス：ユーロ4以下 ◆ 車体右側面拡張タイプ ◆ 後軸エアサスペンション ◆ 車体総重量27トン ◆ 燃料タンク容量300リットル ◆ マニュアル・ギア ◆ アンチロック（ABS）、アンチスリップ（ASR）、横滑り防止（ESP）ブレーキ ◆ 空調付き運転室 ◆ ルーフ・スポイラー ◆ 手すりを取り付け可能なロック付き乗降用ドア×2（側面および拡張部分） ◆ 各ドアの下のスライド式階段 ◆ 底面部の収納エリア ◆ エアコン取り付け専用エリア ◆ 車体右側の拡張部分：約3.2メートル×1.2メートル
0.9	内部エリア	<ol style="list-style-type: none"> 1. 10カメラ搭載大型中継車内部は、下記4つのエリアで構成されること <ul style="list-style-type: none"> ◆ 制作エリア <ol style="list-style-type: none"> ① 制作用卓、5名分作業スペース

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		<ul style="list-style-type: none"> ◆ スローモーションエリア <ul style="list-style-type: none"> ① スローモーション卓、4名分作業スペース ◆ 音声エリア：2名分作業スペース ◆ 技術エリア：4名分作業スペース <p>2. 6カメラ搭載中継車内部は、5つのエリアで構成されること</p> <ul style="list-style-type: none"> ◆ 音声エリア：1 ◆ 制作エリア：1 ◆ スローモーションエリア：1 ◆ 技術（エンジニア）エリア：1 ◆ 作業スペース兼変圧器用スペース：1
0.10	内装	<p>1. 全てのラックは金属製で、防錆のための粉体塗装を施すこと。</p> <p>2. 木製の備品は、合板で表面がラミネート加工されたもので製作すること。</p> <p>3. フローリングは、帯電防止のため塩ビでコーティングすること。</p>
0.11	空調および冷暖房	<p>1. 要員および装備の両方にとって快適な作業環境を確保するため、中継車には、吸気・排気換気システム、冷房システム、暖房システムを装備すること。</p>
0.12	電源設備	<p>1. 中継車の電源設備に関しては、次の法令や規制の最新版を遵守していること。:</p> <ul style="list-style-type: none"> ◆ EU regulations for the machinery directive（機械指令のためのEU機械規則） ◆ EMC directive and low voltage directive（EMC（電磁両立性）指令および低電圧指令） ◆ Safety regulations in particular IEC 60831/IEC 61557 for heavy current systems with nominal voltage up to 1000V（IEC 60831/IEC 61557を始めとする公称電圧1,000ボルトまでの強電流システムに関する各種安全規則） ◆ IEC 60071 power transformers（IEC（国際電気標準会議）60071電源変圧器規格） ◆ IEC 61558-2-6 safety of transformers regulations（IEC 61558-2-6変圧器安全規則） ◆ IEC 60309 - plug connections up to 400V, 63A. 0B-van require two plug connections (inputs with switch over) - 2x 63A/400V（400ボルト63アンペアまでのプラグ接続に関するIEC 60309規格。中継車には63A/400Vのコネクターを2つ装備すること。）（*10

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		<p>カメラ搭載中継車のみ適用)</p> <ul style="list-style-type: none"> ◆ IEC 60309 plug connections up to 400V, 25A (400ボルト25アンペアまでのプラグ接続に関するIEC 60309規格)(*6カメラ搭載中継車のみ適用) ◆ IEC 60947, Low-voltage switchgear and control gear (IEC 60947:低電圧開閉装置および制御装置) ◆ IEC/TR 61439, Low-voltage switchgear and control gear assemblies (IEC/TR 61439:低電圧開閉装置および制御装置組立品) ◆ IEC 61643, Low-voltage surge protective devices (IEC 61643:低電圧サージ防護機器) ◆ IEC 61643-21, IEC 61643-22 Low voltage surge protective devices in telecommunication telecommunications and signalling networks (IEC 61643-21, IEC 61643-22:通信および信号伝達ネットワークにおける低電圧サージ防護機器) <p>2. 機材を正常に作動させるために必要とされる資機材(電源変換プラグや変圧器、電源ケーブル等)を含めること。</p>
0.13	無停電電源システム (UPS system)	<p>すべての音声・映像・制御システムが、停電によって障害を受けないよう、無停電電源システム (UPS) で保護されるよう設計すること。UPS でカバーできる時間は、10分間以上とする。UPS システムの性能は、使用する機器の種類に従って計算し、10%の電源供給余力(残量)を確保するよう留意すること。UPS システムは、有線型UPSに関する規格 IEC62040-3.2.16 class 1 を満たすものとする。</p>
0.14	無線周波数	<p>中継車で使用する全ての無線装置およびシステム(無線カメラ、無線通信システム等)の周波数は、ウクライナ当局(Ukrainian state center of radio frequencies)によってウクライナ領内で使用することが許可された周波数帯に準拠しなければならない。</p>
0.15	映像・音声信号	<p>全ての映像・音声信号は、HD/3G デジタルおよびアナログステレオ音声(+6dB)、および、HD/3G 多重音声の要件に則していること。サポートフォーマットは、SMPTE 292M, SMPTE 424M 規格のHD/3Gとする。</p>

Technical Specifications	Reference brand		Quantity
	Manufacturer	Model	
1 10-Camera OB-Van (10カメラ搭載中継車)			1
1.1 10-Camera OB-Van	Broadcast Solutions	12-CAM OB-Van	
1.2 VAN PLATFORM			
Vehicle type: rigid truck	MAN	TGS26.320_6x2 BL	1
Single, standard cab			
Wheelbase: approx. 5900 mm			
Admissible total weight: 26000 kg or more			
Emissions class Euro 5 EEV or higher level			
Fuel tank 400l or more			
Drive type: 6x2 or 6x4			
Transmission : Manual			
Steering : left hand drive			
Engine Power: 235 KW/320 HP or more			
1.3 COACH BUILDING VAN			
1.3.1 Body	Broadcast Solutions	CUSTOM BUILD	1
Length coach approx.: 9.900 mm (12.000mm incl. base vehicle)			
Height approx: 4.000 mm			
Width in driving position approx. : 2.550 mm			
Max. weight: 26.000kg			
Coach in standard colour (white)			
30mm Sandwich construction			
1.3.2 Expansion side	Broadcast Solutions	CUSTOM BUILD	1
Expansion side right-hand drive - approx. 3,2 x 1,2 meter			
1.3.3 Body configuration	Broadcast Solutions	CUSTOM BUILD	1
Body configuration according to the drawing:			
2x entrance doors with lock and mountable handrail (one in extension, one in sidewall) slidable stair below the entrance doors			
Locker area in belly of the vehicle			
Special aircon mounting areas			
CTP flap 2x 15 RU			
1.3.4 Hydraulic jacks system	Broadcast Solutions	CUSTOM BUILD	1
Special hydraulic 4 jacks system, auto levelling with cable remote panel			
1.3.5 Rear view camera	Broadcast Solutions	CUSTOM BUILD	1
Rear view camera equipped.			
1.3.6 Cable reel unit	Schill	MPL 12.600.250.110	1
Motorized cable reel unit for 12x up to 200m SMPTE cable.			
1.3.7 OB-Van inner space	Broadcast Solutions	CUSTOM BUILD	1
OB-Van inner space is splitted into four areas, according to drawing:			
Production / Slomo			
Production table, slidable, 5 workplaces			
Slomo table, 4 workplaces			
Audio			
2 workplaces			
Overhead audio 3x 9RU			
Engineering			
4 workplaces (3x shader 1x TOM/EIC)			
4x 19"rack for shader with Monitoring			
CAR			
Central racks 4x 44 RU + 1x 28 RU for Electro and Aircon			
Noise reduction doors for central racks			
1.4 POWER SYSTEM			
1.4.1 OB-Van power system	Broadcast Solutions	PWR-SYS	1
Suitable OB-Van power system with the following:			
1.4.2 Power input			
2x 63A/400 V input with switchover			
1.4.3 Transformer			
45 kVA isolating transformer			
1.4.4 Cable reel			
Motorized cable reels for 2x 40 m input power cable			
1.4.5 Battery			
2x 12 /230 Ah technical battery			
1.4.6 Battery charger			
230 V / 24 V battery charger with power supply (garage mode)			
1.4.7 Lighting system			
Lighting system for workplaces			
1.4.8 Rigging light			
Rigging lights outside of body			
1.4.9 UPS	Eaton	9SX 8kVA	3
UPS with Rack-Kit			
Power module and 2x Extended battery modules (EBM)			
Rating (kVA/kW) - 8 kVA/7.2 kW or more			
Technology - On-line double-conversion with Power Factor Correction (PFC) system			
Nominal voltage - including 200/208/220/230/240/250 V			
Input voltage range - 176-276V without derating /100-276V with derating or wider			
Input frequency range - 40-70 Hz, 50/60 Hz autoselection, frequency converter as standard			
Efficiency - Up to 95% or more in Online mode, 98% or more in Hi-Efficiency mode			
Crest factor/short circuit current - 3:1/120 A			
Overload capacity - 102-110% : 120 s or more, 110-125%: 60 s or more, 125-150%: 10 s or more, >150%: 900 ms or more			
Input - Terminal block (up to 16 mm ²)			
Outputs - Terminal block			

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Typical backup times at 50% load - 25min or more (depend from battery age, temperature, etc).			
Battery management - ABM® & Temperature compensated charging method , Automatic battery test, deep discharge protection, automatic recognition of external battery units.			
Communication ports - including USB and Serial ports (cannot be used simultaneously), Dry contact, 1 Remote On/Off			
Communication slot - including 1 slot for Network-M2, Network-MS, ModBus-MS or Relay-MS cards.			
Dimensions HxWxD/Weight of Power module - 440 (19") x 130(3U) x 700mm/19kg or less			
Dimensions HxWxD/Weight of EBM - 440 (19") x 130(3U) x 680mm/65kg or less			
1.4.10 Air-conditioning system	Broadcast Solutions	custom built	1
Suitable OB-Van air-conditioning system with following cooling/heating power:			
1.4.11 Air-conditioner - PRODUCTION/SLOMO Set of:	Mitsubishi heavy Industries	FDC 71 VNX / FDT 71VG / RC 5E	
Monosplit inverter heatpump outdoor unit			
Max. cooling power 7,1 kW or more			
Max. heating power 8 kW or more			
High pressure channel type evaporator			
Cable remote control			
Cooling operation temperature -15 to +43°C or wider			
Heating operation temperature -20 to +20°C or wider			
1.4.12 Air-conditioner - ENGINEERING & AUDIO	Broadcast Solutions	custom built	
1.4.12.1 Outdoor unit	Mitsubishi heavy Industries	SCM 71ZM-S	
Multisplit inverter heatpump			
Max. cooling power 7.1 kW or more			
Max. heating power 8.6kW or more			
Cooling operation temperature -15 to +43°C or wider			
Heating operation temperature -20 to +20°C or wider			
1.4.12.2 Engineering	Mitsubishi heavy Industries	SRR 60 ZM-S	
Max. cooling power 6,0 kW or more			
Max. heating power 6,8kW or more			
Channel type evaporators			
1.4.12.3 Audio	Mitsubishi heavy Industries	SRR 25 ZM-S	
Max. cooling power 2,5 kW or more			
Max. heating power 3,4 kW or more			
Channel type evaporators			
1.4.12.4 Cable remote controller	Mitsubishi heavy Industries	RC-E5	
Cable remote controller: Equipped			
1.4.13 Air-conditioner - CAR Set of:	Mitsubishi heavy Industries	SRC 60 ZMX-S / FDUM 50VF / RC-E5	
Monosplit inverter heatpump outdoor unit			
Max. cooling power 5.6 kW or more			
Max. heating power 6.7kW or more			
High pressure channel type evaporator			
Cable remote control			
Cooling operation temperature -15 to +46°C or wider			
Heating operation temperature -15 to +20°C or wider			
1.4.14 Fresh air system	Broadcast Solutions	custom built	1
Fresh air system with fan, filter box, speed control and air distribution. Permanent input of filtered fresh air for the operators			
1.4.15 Pre-heater	Webasto	Airtop 2000 STC 24V D	3
Diesel pre heating, 2kW, with mounting set and cable remote control			
Heat output (kW) (BTU/h) 0.9 – 2.0			
Heat output (BTU/h) 3,000 - 7,000			
Fuel Diesel			
Fuel consumption (l/h) 0.12 – 0.24 or less			
Rated voltage (V) 24			
Rated power consumption (W) 14-29 or less			
Dimension L x W x H (mm) 310 x 120 x 118 or less			
Net weight (kg) 2,6 or less			
2 CAMERA			
2.1 CAMERA HEADS / TRANSMISSION			
2.1.1 2/3-inch 4K 3CMOS System Camera	SONY	HDC-3200	8
Camera 2/3-inch type 4K CMOS sensor with global shutter, 3-CMOS, RGB, Effective resolution (H x V) QFHD: 3840 x 2160 HD: 1920 x 1080 Sensitivity F10 with 1080/59.94p F11 with 1080/50p (at 2,000 lx with 89.9% reflectance) Noise level -62 dB Horizontal resolution 2,000 TV lines (at center of screen) 1,000 TV lines (at center of screen) Geometric distortion Negligible (not including lens distortion) Spectrum system F1.4 prism Built-in filters ND filters 1: CLEAR, 2: 1/4ND, 3: 1/16ND, 4: 1/64ND, 5: Cross filter CC filters B: 3200K, C: 4300K, D: 6300K			
Video Modes 1080/59.94i, 1080/23.98PsF 1080/24PsF, 1080/29.97PsF 1080/59.94p 720/59.94p, 1080/119.88i 720/119.88p, UHD/59.94p			

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<p>Input/output connectors CCU: Optical/electrical multi connector LENS: 12-pin (x1) VF: 20-pin (x1) MIC 1 IN: XLR 3-pin, female (x1) AUDIO IN CH1, CH2: XLR 3-pin, female (x1 each) When AUDIO switch is set to MIC: -60 dBu (can be selected up to -20 dBu by menu operation), balanced When AUDIO switch is set to LINE: 0 dBu, balanced INTERCOM 1: XLR 5-pin, female (x1) INTERCOM 2: No DC IN: XLR 4-pin (x1), DC 10.5 to 17 V DC OUT: 4-pin (x1), DC 10.5 to 17 V, max. 0.5 A 2-pin (x1), DC 10.5 to 17 V, Max. 2.5 A SDI 1: BNC (x1) SDI MONI: BNC (x1) TEST OUT: BNC (x1) PROMPTER/GENLOCK: BNC (x1) PROMPTER 1 Vp-p, 75 Ω GENLOCK HD: SMPTE ST274, tri-level sync, 0.6 Vp-p, 75 Ω, SD: Black burst (NTSC: 0.286 Vp-p, 75 Ω/PAL: 0.3 Vp-p, 75 Ω)</p>			
<p>General Power requirements AC 240 V, 1.4 A (max.), DC 12 V, 9.5 A (max.), DC 240 V, 1.05 A (max.) DC 240 V, 1.05 A (max.) Operating temperature -20°C to +45°C Storage temperature -20°C to +60°C Mass Approx. 4.6 kg (Unit only)</p>			
<p>2.1.2 Camera Control Unit</p>	<p>SONY</p>	<p>HDCU-3500//U</p>	<p>8</p>
<p>Input/output connectors CAMERA: FIBER Optical fiber connector INTERCOM/TALLY/IO PORT: D-sub 50-pin connector (x1), INTERCOM (PROD/ENG), 4 W: 0 dBu, RTS: 0 dBu, CC: -14 dBu, PGM, 3 systems, 0dBu/-20dBu, TALLY (R, G, Y), FLAG RCP/CNU: 8-pin multi-connector (x1) TRUNK: 12-pin (x1) LAN-COM: 8-pin (x1) NETWORK TRUNK: 8-pin (x1) SDI I/O 1 to 4 3G/HD/SD-SDI I/O, BNC (x4), 3G-SDI: SMPTE ST424/425 Level-A/B, 0.8 Vp-p, 75 Ω, 2.970 Gbps/2.967 Gbps, HD-SDI: SMPTE ST292, 0.8 Vp-p, 75 Ω, 1.485 Gbps/1.4835 Gbps SD-SDI: SMPTE ST259, 0.8 Vp-p, 75 Ω, 270Mbps, 3G-SDI/HD-SDI/SD-SDI, character signal selectable REFERENCE IN/OUT BNC (x2), loop-through output, HD: SMPTE ST274, tri-level sync, 0.6 Vp-p, 75 Ω, SD: Black burst (NTSC: 0.286 Vp-p, 75 Ω/PAL: 0.3 Vp-p, 75 Ω) or NTSC 10F-BB</p>			
<p>Input connectors AC IN: AC 100 V to 240 V (x1) SDI RET 1 to 4: BNC (x4), 3G-SDI: SMPTE ST424/425, 2.970 Gbps/2.967 Gbps, HD-SDI: SMPTE ST292, 1.485 Gbps/1.4835 Gbps, SD-SDI: SMPTE ST259, 270 Mbps PROMPTER 1 PROMPTER 2/VBS-RET BNC: (x2), loop-through output during 1CH mode, terminate internally at 75 Ω during 2CH mode, analog signal, 1.0 Vp-p, 75 Ω Output connectors AUDIO OUT CH1, CH2: XLR 3-pin, male (x2), 0dBu/-20 dBu/+4 dBu CHARACTER/ABS/EBU: BNC (x1), VBS, 1 Vp-p, 75 Ω AES/EBU format VBS/HD and AES/EBU selectable SDI OUT 1 to 4: 3G/HD/SD SDI OUTPUT, BNC (x4), 3G-SDI: SMPTE ST424/425 Level-A/B, 0.8 Vp-p, 75 Ω, 2.970 Gbps/2.967 Gbps, HD-SDI: SMPTE ST292, 0.8 Vp-p, 75 Ω, 1.485 Gbps/1.4835 Gbps SD-SDI: SMPTE ST259, 0.8 Vp-p, 75 Ω, 270 Mbps, 3G-SDI/HD-SDI/SD-SDI, character signal selectable UHD SDI A, B, C, D: 12G/3G/HD SDI OUTPUT, BNC (x2) 12G SDI: SMPTE ST2082, 0.8 Vp-p, 75 Ω, 11.88 Gbps/11.868 Gbps * 12G SDI can be selected by installing the HZCU-UHD35. 3G SDI: SMPTE ST424/425 Level-A/B, 0.8 Vp-p, 75 Ω, 2.970 Gbps/ 2.967 Gbps HD SDI: SMPTE ST292, 0.8 Vp-p, 75 Ω, 1.485 Gbps/1.4835 Gbps</p>			
<p>General Power requirements 100 V to 240 V AC, 50/60 Hz Current consumption 4.5 A (max.) Operating temperature -10 °C to +40 °C Storage temperature -20 °C to +60 °C Mass Approx. 6.3 kg</p>			
<p>2.2 VIEWFINDER</p>			
<p>2.2.1 OLED 0.7-inch colour HD viewfinder</p>	<p>SONY</p>	<p>HDVF-EL20//U</p>	<p>2</p>

<p>Display Type0.7" (1.8 cm) Color OLED Display Area (HxV).5 x 1.0 cm 16:9 Aspect ratio Diopter RangeFor Loupe: -4.0 to +2.0 m-1 Brightness200 cd/m2 (Typical) Effective Pixels1920 (H) x 1080 (V) x 3 (RGB) Color TemperatureD65 Digital Scanning Frequency (H / V)1080 Scanning Lines: 23.98PsF: 26.97 kHz / 47.95 Hz 24PsF: 27.00 kHz / 48 Hz 25PsF: 28.13 kHz / 50 Hz 29.97PsF: 33.72 kHz / 59.94 Hz 50i: 28.13 kHz / 50 Hz 59.94i: 33.72 kHz / 59.94 Hz 720 Scanning Lines: 50P: 36.00 kHz / 50 Hz 59.94P: 44.96 kHz / 59.94 Hz Input SignalsY: 1.0 Vpp, Synchronous, 75 Ohm terminated Pb, Pr: 0.7 Vpp, Asynchronous, 75 Ohm terminated Camera ConnectorRound type 20-pin Power Supply10.5 to 17.0 VDC (Supplied by the camera) Power Consumption6.9 W TemperatureStorage: -20 to 60°C Operating: -20 to 45°C Dimensions (Folded)20.7 x 21.2 x 8.0 cm Weight0.8 kg</p>			
2.2.2 Full HD 7.4-inch OLED viewfinder	SONY	HDVF-EL740	7
<p>Display TypeColor OLED Diagonal Screen Size7.4" (18.8 cm) Effective Picture Size (H x V)(16.4 x 9.2 cm) Effective Pixels960 x 540 x 3 (RGB) Brightness350 cd/m2 TV Lines500 or more Color TemperatureApprox. 6500K daylight (D65) Camera ConnectorD-sub 25-pin x1 Supported Formats1080-line: 23.98PsF, 24PsF, 25PsF, 29.97PsF, 30PsF, 50i, 59.94i, 60i 720-line: 50p, 59.74p, 60p Power Requirement10.5-17.0 V DC Power Consumption19.5 W Operating Temperature-20 to +45°C Dimensions (WxHxD)30.8 x 22.3 x 28.9 cm Weight: 3.8 kg</p>			
2.2.3 Sports Hood for HDVF-EL70/75	SONY	VFH-790	7
2.3 CAMERA OPERATION CONTROL			
2.3.1 Camera Control Panel	SONY	RCP-3100//U	8
<p>Joystick type of remote camera control panel General Power Supply: DC 10.5 to 30 V, PoE (IEEE802.3af Class2) Power Consumption: 4 W Operation Temperature5 to 40°C Dimensions (W x H x D): (excluding protrusions)80 x 310 x 125 mm Mass: 1.4 kg Input/output connectors LAN: RJ-45 8pin (x1) 10BASE-T, 100BASE-TX, 1000BASE-T CCU/CNU: Multi-connector 8pin, female (x1) EXT I/O: D-Sub 9-pin, female (x1)</p>			
2.3.2 Master Set up Unit	SONY	MSU-3500//U	1
<p>Master setup unit, multi camera remote control panel for system cameras (vertical type) General Power Supply: AC 100 - 240 V 50/60 Hz 0.30 A (Max.) DC 10.5 - 17 V 2.3 A (Max.) Operating Temperature: 5 °C to 40 °C Storage Temperature: -20 °C to 60 °C Dimensions (W x H x D): 204 x 310 x 67 mm MassApprox. 3.4 kg Input/output Connectors LAN: RJ-45 8pin (x1) 1000BASE-T, 100BASE-TX, 10BASE-T Remote CCU/CNU: Multi-connector 8-pin, female (x1) AUX: Multi-connector 8-pin, female (x1) I/O Port:D-Sub 50-pin, female (x1) AC In: 3-pin (x1) DC In: XLR 4-pin (x1)</p>			
2.4 ACCESSORIES			
2.4.1 Tripod Adaptor For Port. Cameras/Camc.	SONY	VCT-14	8
Specification			
Use: to mount the comer on the proposed tripod			
Function: Quick attach and release mechanism			
2.4.2 Shot Gun Microphone	RODE	NTG1	2
Specification			
Type: Condenser microphone			
Directional pattern: Super-cardioid			
Frequency range: 20 to 20,000Hz or wider			
Sensitivity: -36dB ±2dB re 1V/Pa @ 1kHz or better			

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Nominal impedance: 50Ω			
Equivalent noise: 18dBA SPL (A-weighted per IEC651) or better			
Maximum output: +6.9dBu (@ 1% THD into 1kΩ) or more			
Dynamic range: 121dB (per IEC651) or more			
Maximum SPL: 139dB (@ 1kHz, 1% THD into 1kΩ load)			
Signal/Noise: 76dB SPL (A-weighted per IEC651)			
Dimensions:			
Length: 220mm or similar			
Diameter: 22mm or similar			
output connection: 3-pin XLR			
Weight : 105g or less			
Power requirement: 48V Phantom Power			
Accessories: Manufacturer standard accessories			
2.4.3 Windscreen for Shotgun Microphone	RODE	WS6	2
Specification			
Use: for shotgun microphones			
Maximum microphone length of slot: 160mm or similar			
Maximum microphone diameter: 21 to 22.5mm			
2.4.4 Fiber Cable	Broadcast Solutions	CUSTOM	12
Specification			
Type: Both-end connectorized fibre cable			
Fiber cable type: to be proposed			
Length: 5 m			
Connector type: to be proposed			
2.4.5 Flight Case for Camera Head and Accessories	Broadcast Solutions	CUSTOM	7
Specification			
Use: for transportation of Camera head and accessories			
Durability: shall be strong enough in harsh environment			
Size/shape/composition: to be proposed			
2.4.6 Flight Case for Camera Head, 46x Lens and Accessories	Broadcast Solutions	CUSTOM	1
Specification			
Use: for transportation of Camera head and accessories			
Durability: shall be strong enough in harsh environment			
Size/shape/composition: to be proposed			
2.4.7 Rain Cover for Box Lens Camera	Broadcast Solutions	CUSTOM	1
Specification			
Use: to protect the camera from heavy rain			
Size/shape/material: to be proposed			
2.4.8 Winter Cover for Box Lens Camera	Broadcast Solutions	CUSTOM	1
Specification			
Use: to protect the camera from cold environment			
Size/shape/material: to be proposed			
2.4.9 Rain Cover for ENG/EFP Camera	Broadcast Solutions	CUSTOM	7
Specification			
Use: to protect the camera from heavy rain			
Size/shape/material: to be proposed			
2.4.10 Winter Cover for ENG/EFP Camera	Broadcast Solutions	CUSTOM	7
Specification			
Use: to protect the camera from cold environment			
Size/shape/material: to be proposed			
2.4.11 Headset	Beyerdynamic	DT 290 MK II	7
Specification			
Headphone			
Type: Headset double muff type with cable			
Frequency range: 10 to 30kHz or wider			
Nominal impedance: 200/80Ω			
Nominal SPL at 1kHz: 100dB SPL at 1mW or better			
T.H.D: 0.2% or less			
Nominal power rating: 100mW or similar			
Weight without cable: 240g or less			
Microphone			
Type: Dynamic microphone			
Frequency response: 40 to 12kHz or wider			
Polar pattern: Hypercardioid			
Output voltage at a distance of 5cm: approx. 1.5V/Pa			
Nominal impedance: 200Ω			
Outer diameter: approx. 23mm			
Accessories: Manufacturer standard accessories			
2.4.12 Headset	Beyerdynamic	DT 280 MK II	2
Specification			
Headphone			
Type: Headset single muff type with cable			
Frequency range: 10 to 30kHz or wider			

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Nominal impedance: 200/80Ω			
Nominal SPL at 1kHz: 100dB SPL at 1mW or better			
T.H.D: 0.2% or less			
Nominal power rating: 100mW or similar			
Weight without cable: 240g or less			
Microphone			
Type: Dynamic microphone			
Frequency response: 40 to 12kHz or wider			
Polar pattern: Hypercardioid			
Output voltage at a distance of 5cm: approx. 1.3mV/Pa			
Nominal impedance: 200Ω			
Outer diameter: approx. 23mm			
Accessories: Manufacturer standard accessories			
2.5 LENS			
2.5.1 Box Lens			
2.5.1.1 4K EFP Box Lens without Trunk	FUJINON	UA107x8.4BESM-T45 without trunk	1
Specification			
Application: 2/3" Format Color Camera			
Focal length: 8.4 to 900mm			
Zoom ratio: 107 x			
Maximum relative aperture: F1.7 8.4 to 340mm) to F4.5 (900mm)			
Iris range: F1.7 to F16, Closed			
Image Format (H × V): 9.59 × 5.39mm (φ 11.0mm) Aspect Ratio 16 : 9			
Minimum Object Distance (from front of Lens): 3.05 m			
Field Angle (H): 59°26' × 0°37'			
Field Angle (V): 35° 35' × 0°21'			
Mount: B4 Mount			
Dimensions:			
Length: 610mm or less			
Width: 264mm or less			
Height: 258mm or less			
Mass (without Lens Hood, Approx.): 24kg or less			
Accessories: Manufacturer standard accessories			
2.5.1.2 Lens Support for Box Lens	FUJINON	ELH-112B-35A	1
Specification			
Lens Supporter for Box lens			
2.5.1.3 Zoom + Focus Control Complete Kit	FUJINON	SS-21DC Servo Kit	1
Specification			
Type: Digital servo control kit for 2.5.1.1 4K EFP Box Lens			
Composition: including followings			
Digital zoom demand with mounting clump			
Digital focus demand with mounting clump			
Connection cables			
Accessories: Manufacturer standard accessories			
2.5.1.4 Flight Case	Broadcast Solutions	CUSTOM	1
Specification			
Use: for transportation of 2.5.1.1 4K EFP Box Lens			
Durability: shall be strong enough in harsh environment			
Size/shape/composition: to be proposed			
2.5.2 Tele Lens			
2.5.2.1 4K ENG Long Tele Lens with Trunk	FUJINON	UA46X9.5BERD-U1 WITH TRUNK	1
Specification			
Application: 2/3" Format Color Camera			
Focal length: 9.5 to 437mm			
Zoom ratio: 46 x			
Iris range: F2 to F16, Closed			
Image Format (H × V): 9.59 × 5.39mm (φ 11.0mm) Aspect Ratio 16 : 9			
Minimum Object Distance (from front of Lens): 2.8m			
Field Angle (H × V) WIDE: 1.3°× 0.7°			
Field Angle (H × V) TELE: 53.6°× 31.7°			
Full Length: 240.5mm or less			
Mount: Bayonet Mount			
Dimensions:			
Diameter: φ147mm or less			
Length: 346mm or less			
Mass (without Lens Hood, Approx.): 5.7kg or less			
Accessories: Manufacturer standard accessories			
2.5.2.2 Lens Support for Long Tele Eng Lens	FUJINON	ALH-127A-01A	1
Specification			
Lens Supporter for Box lens			
2.5.2.3 Protection Filter for ENG Long Tele Lenses	FUJINON	EPF-127	1
Specification			
Use: to protect 2.5.2.1 4K ENG Long Tele Lens			
2.5.2.4 Zoom + Focus Control Complete Kit	FUJINON	SS-15D-02 Servo Kit	1
Specification			

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Type: Digital servo control kit for 2.5.2.1 4K ENG Long Tele Lens			
Composition: including followings			
Digital zoom demand with mounting clump			
Digital focus demand with mounting clump			
Connection cables			
Accessories: Manufacturer standard accessories			
2.5.3 EFP Lens			
2.5.3.1 4K ENG/EFP Lens	FUJINON	UA23x7.6BERD-S10	3
Specification			
Application: 2/3" Format Color Camera			
Focal length: 7.6 to 175mm			
Zoom ratio: 23 x			
Maximum relative aperture: F1.8 (7.6 to 119mm) to F2.65 (175mm)			
Iris range: F1.8 to F16, Closed			
Image Format (H x V): 9.59 x 5.39mm (φ 11.0mm) Aspect Ratio 16 : 9			
Minimum Object Distance (from front of Lens): 0.8 m (0.04 m in Macro Operation)			
Field Angle (H x V) WIDE: 64.5°x 39.0°			
Field Angle (H x V) TELE: 3.1°x 1.8°			
Full Length: 222mm or less			
Digital drive unit: including followings			
Accurate and swift zooming and focusing			
Ultra-slow and smooth zooming and focusing			
Outputting zoom, focus and iris position at 16-bit			
Automatic compensation of focus breathing			
Mount: Bayonet Mount			
Dimensions:			
Diameter:φ100mm or less			
Length: 222mm or less			
Mass (without Lens Hood, Approx.): 2kg or less			
Accessories: Manufacturer standard accessories			
2.5.3.2 Protection Filter for ENG/EFP Lenses			
2.5.3.2 Protection Filter for ENG/EFP Lenses	FUJINON	EPF-107	3
Specification			
Use: to protect 2.5.3.1 4K ENG/EFP Lens			
2.5.3.3 Zoom + Focus Control Complete Kit			
2.5.3.3 Zoom + Focus Control Complete Kit	FUJINON	SS-15D-02 Servo Kit	3
Specification			
Type: Digital servo control kit for 2.5.3.1 4K ENG/EFP Lens			
Composition: including followings			
Digital zoom demand with mounting clump			
Digital focus demand with mounting clump			
Connection cables			
Accessories: Manufacturer standard accessories			
2.5.4 ENG Lens			
2.5.4.1 4K ENG/EFP Lens	FUJINON	UA14x4.5BERD-S10B	3
Specification			
Application: 2/3" Format Color Camera			
Focal length: 4.5 to 63mm			
Zoom ratio: 14 x			
Maximum relative aperture: F1.8 (4.5 to 41mm) to F2.8 (63mm)			
Iris range: F1.8 to F16, Closed			
Image Format (H x V): 9.59 x 5.39mm (φ 11.0mm) Aspect Ratio 16 : 9			
Flange Focal Length (IN AIR): 48mm (Adjustable Range: ± 0.2mm)			
Minimum Object Distance (from front of Lens): 0.3 m (0.05 m in Macro Operation)			
Field Angle (H x V) WIDE: 93.6°x 61.8°			
Field Angle (H x V) TELE: 8.7°x 4.9°			
Full Length: 239mm or less			
Digital drive unit: including followings			
Accurate and swift zooming and focusing			
Ultra-slow and smooth zooming and focusing			
Outputting zoom, focus and iris position at 16-bit			
Automatic compensation of focus breathing			
Mount: Bayonet Mount			
Dimensions:			
Diameter:φ95mm or less			
Length: 239mm or less			
Mass (without Lens Hood, Approx.): 2.3kg or less			
Accessories: Manufacturer standard accessories			
2.5.4.2 Protection Filter for ENG/EFP Lenses			
2.5.4.2 Protection Filter for ENG/EFP Lenses	FUJINON	EPF-127	3
Specification			
Use: to protect 2.5.4.1 4K ENG/EFP Lens			
2.5.4.3 Zoom + Focus Control Complete Kit			
2.5.4.3 Zoom + Focus Control Complete Kit	FUJINON	SS-15D-02 Servo Kit	3
Specification			
Type: Digital servo control kit for 2.5.4.1 4K ENG/EFP Lens			
Composition: including followings			
Digital zoom demand with mounting clump			
Digital focus demand with mounting clump			
Connection cables			
Accessories: Manufacturer standard accessories			

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2.6 TRIPOD			
2.6.1 Tripod System for Box Lens Camera			
2.6.1.1 Fluid Heads Flat Base	CARTONI	HM6500	1
Specification			
Minimum Payload Capacity: 20kg or less			
Maximum Payload Capacity: 80kg or more			
Bowl Diameter: Flat			
Fluid Drag: Continuous			
Counterbalance: Continuous			
Pan Range: 306°			
Tilt Range: +/-65°			
Operating temperature range: -40 to 60°C or wider			
Weight: 16kg or less			
Accessories: Manufacturer standard accessories			
2.6.1.2 Telescopic Pan Bar	CARTONI	AH844/M	1
Specification			
Use: for 2.6.1.1 Fluid Heads Flat Base			
2.6.1.3 Camera Plate	CARTONI	AH868	1
Specification			
Use: Dovetail Camera plate for 2.6.1.1 Fluid Head (with two 3/8" screws)			
2.6.1.4 Heavy Duty Tripod	CARTONI	T625/M	1
Specification			
Capacity: 200kg or more			
Maximum Height: 130cm or more			
Folded Height: 89cm			
Material: Aluminum			
Number of stages: 1			
Weight: 11kg or less			
2.6.1.5 Spreader	CARTONI	S732/HDML	1
Specification			
Use: for 2.6.1.4 Heavy Duty Tripod			
2.6.1.6 Dolly	CARTONI	D736/P	1
Specification			
Load capacity: 200kg or more			
Dolly leg radius: 500mm or similar			
Folded Height: 89cm			
Material: Aluminum			
Wheel Diameter: 200mm or similar			
Weight: 15kg or less			
2.6.1.7 Pivot Feet	CARTONI	AT865	1
Specification			
Pivoting tripods aluminum feet			
Use: for 2.6.1.4 Heavy Duty Tripod			
2.6.1.8 Case for Fluid Head	CARTONI	C948	1
Specification			
Waterproof Molded Case with Wheels			
Use: for 2.6.1.1 Fluid Heads Flat Base			
2.6.1.9 Case for Heavy Duty Tripod	CARTONI	C941	1
Specification			
Waterproof PP Case with Wheels			
Use: for 2.6.1.4 Heavy Duty Tripod			
2.6.2 Tripod System for Tele Lens Camera			
2.6.2.1 Tripod System	CARTONI	KSDS22-A	1
Tripod System			
Weight: 8.7 kg			
Capacity: 22 kg			
Minimum Height: 70 cm			
Maximum Height: 181 cm			
Material: Aluminum			
Number of stages: 2			
Spreader: Smart Lock Mid-level			
2.6.2.2 Telescopic Pan Bar	CARTONI	AH842	1
Specification			
Use: for the 2.6.2.1 Tripod System			
2.6.2.3 Dolly	CARTONI	D834	1
Specification			
Use: for the 2.6.2.1 Tripod System			
2.6.3 Tripod System for ENG/FEP Lens Camera			
2.6.3.1 Tripod System	CARTONI	KSDS18-A	6
Specification			

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Type; 2 stages aluminum tripod			
Head: Fluid head with 1 handle			
Maximum height: 163cm or more			
Minimum height: 78cm or less			
Capacity: 18kg or more			
Weight: 8kg or less			
Spreader: Smart lock mid-level			
2.6.3.2 Telescopic Pan Bar	CARTONI	AH842	6
Specification			
Use: for the 2.6.3.1 Tripod System			
2.6.3.3 Dolly	CARTONI	D834	6
Specification			
Use: for the 2.6.3.1 Tripod System			
2.7 POV CAMERAS			
2.7.1 Goal Camera Kit	Broadcast Solutions	GoalCam 4K Kit	1
Specification			
Kit contains:			
2 x POV 4K camera Ultra wide angle			
2 x 5 meters control cable			
2 x Goal camera enclosure			
1 x Universal RCP			
2 x Camera interface			
2 x Flight cases.			
Cameras:			
Resolution: UHD 3864 x 2196			
Mount: C Mount / CS Mount / S Mount			
Size: 36 x 36 x 79mm or similar			
Weight: 122g or less			
Sensor Type: 1 / 2.5 " or similar			
Pixel size: 1.62um or similar			
Diameter: 7.2mm or small			
Filter: IR cut			
Shutter type: Rolling or equivalent			
Sensitivity: 2000 Lx or better at 50Hz F2.4			
Maximum FOV (H) : 85° or more at 3.4mm lens			
SDI output: including 2 x HD-BNC			
Control: including RS485 / RS422 / UART 3.3V			
Genlock -- Trilevel Sync in / out			
Voltage range: 9V-36V or wider			
Power consumption: 4.5W or less at 12V			
RCP (Remote Control Panel)			
provide control for two cameras or more			
Functions: including followings			
White balance Manual/AWB/ATW auto modes			
Black balance, ABB			
Master Black and Black Gamma			
Iris, Gain, ND filters			
Shutter, Clear Scan			
AUTO Iris, Auto Focus			
Saturation, Matrix, Multi-Matrix			
Knee, White Clip			
Detail, Coring, Skin Detail			
Denoise			
Tally display and GPIO input			
Full Camera OSD Menu Access and Navigation			
Touchscreen for Pan & Tilt or Gimbal control			
Auto/manual focus, Zoom when available			
Camera switching and Touch Down			
Scene files for all cameras, option to save all at once			
Custom Camera functions based on selected models			
Status Information, IP addresses, remote connection			
Specifications of RCP			
Display: Capacitive 3.5" touchscreen with wide viewing angle or superior			
Push Buttons: Illuminated switches with tactile feedback			
Rotary knobs: Encoders with push function			
Ports: including followings			
2 accessory ports for extensions			
2 USB ports at the back for supported peripherals			
Network Interface 10/100 Ethernet (RJ-45) with PoE (Power over Ethernet)			
Power: PoE 802.3af or DC Input +12V 1W Max			
Size: 280 x 130 x 70mm or similar			
Weight: 750g or less			
Fiber converters:			
Ports: including followings			
1 x 12G SDI IN , 1 x 12G SDI OUT, 2 x RJ45 10/100/1000 Base-T, LC connectors			
Size: 130 x 90 x 45mm or smaller			
2.7.2 Variable Friction Arm	MANFROTTO	244	2
Specification			
Precision-controlled movement arm			

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Extendable to 53cm for maximum flexibility			
Payload: 3kg or more			
Top attachment: 16mm with 1/4" female attachment			
Bottom attachment: 16mm with 1/4" female attachment			
Weight: 1.1kg or less			
2.7.3 Clump	MANFROTTO	M035VR	2
Specification			
Payload: 15kg or more			
Clamp range (max. round tube): 55mm or more			
Clamp range (min. round tube): 13mm or less			
Weight: 0.5kg or less			
2.7.4 Power Cable with Drum	Varytec	391455	2
Specification			
Cable: H07RN-F 3x 1.5mm ² or equivalent			
Cable length: 50 m			
Ingress Protection (Plug & Socket): IP44			
Outer drum diameter: 300mm or smaller			
Outer drum depth: 150mm or smaller			
Cable drum material: Metal			
2.7.5 Fiber Cable	Broadcast Solutions	custom made	2
Specification			
Type: Both-end connectorized duplex fibre cable coiled on cable drum			
Fiber cable type: Singlemode, 2 fibers			
Length: 150 m			
Connector type: Aluminum waterproof LC connectors			
Drum type: CDR 310 or similar			
2.7.6 Fiber optic patch cord	Broadcast Solutions	CUSTOM	2
Specification			
Type: Duplex jumper code			
Length: 3m			
Core/cladding: 9/125μ			
Jacket: LSZH			
Connector: LC/LC			
3 VIDEO			
3.1 ROUTER AND MULTI VIEWER			
3.1.1 Multiformat Video Router	ROSS	custom build	1
3.1.1.1 Multiformat Video Router 5RU Frame	ROSS	ULTRIX-FR5	1
Specification			
Video matrix size (depending on quantity of I/O Unit installed): 160 x160 or more			
Embedded audio max.(depending on quantity of I/O Unit installed) : 3456 x 3456 or more			
Input specification: including followings			
Standard input: HD BNC			
Signal type: SDI 270 Mb/s, 1.5 Gb/s, 3.0 Gb/s			
Impedance: 75Ω			
Max input level: 800mV			
Return loss: Per SMPTE 2082-1			
Typical equalization: UHD 60m, 3G 180m, HD 200m, SD 400m			
SFP aux port: 2x			
Output specification: including followings			
Standard output: HD BNC			
Signal type: SDI 270 Mb/s, 1.5 Gb/s, 3.0 Gb/s			
Impedance: 75Ω			
Amplitude: 800mV +/- 10%			
Rise & fall time: 270Mb/s: 400-800ps or wider, 1.5 & 3Gb/s: 135ps or less			
DC offset: 0.0V +/- 10%			
Overshoot: 10% or less			
Jitter: 0.2 UI or less Alignment (up to 3G), 2UI or less, Timing (up to 270M), 1UI or less Timing (1.5G), 2UI or less Timing (3G)			
Return loss: Per SMPTE 2082-1			
SFP aux port: 2x			
Embedded Audio Specifications			
Audio channels per I/O: 16			
Physical			
Dimensions:			
Width: 445mm or less			
Depth: 200mm or less			
Height: 44.5mm or less			
Frame weight (approx.): 4.1kg			
3.1.1.2 Rackmount 1RU Power Supply	ROSS	ULTRIPower	1
Specification			
Inputs: 90 to 240Vac or wider			
Positive output: 15Vdc			
Maximum total output: 1200W or more			
On-board cooling: Controlled fans			
Physical			
Dimensions:			
Width: 445mm or less			

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Depth: 210mm or less			
Height: 44.5mm or less			
Weight (approx.): 3.3kg			
3.1.1.3 Additional Power Supply	ROSS	ULTRIPower-PS	1
Specification			
Inputs: 90 to 240Vac or wider			
Positive output: 15Vdc			
Maximum total output: 1200W or more			
On-board cooling: Controlled fans			
Dimensions:			
Width: 445mm or less			
Depth: 210mm or less			
Height: 45mm or less			
Weight (approx.): 3.3kg			
3.1.1.4 Control Module for Router Frame	ROSS	ULTRIX-UCCI	1
Specification			
Features: Including followings			
Control redundancy feature provides built-in redundancy for routing system.			
Communications can be monitored via the LEDs on the ULTRIX-UCCI Control hardware or			
3.1.1.5 Additional I/O Board	ROSS	ULTRIX-HDX-IO	6
Specification			
Video matrix size: 16x16 or more			
Embedded audio: 256x256 or more			
Input specification: including followings			
Standard input: HD BNC			
Signal type: SDI 270 Mb/s, 1.5 Gb/s, 3.0 Gb/s			
Impedance: 75Ω			
Max input level: 800mV			
Return loss: Per SMPTE 2082-1			
Typical equalization: UHD 60m, 3G 180m, HD 200m, SD 400m			
SFP aux port: 2x			
Output specification: including followings			
Standard output: HD BNC			
Signal type: SDI 270 Mb/s, 1.5 Gb/s, 3.0 Gb/s			
Impedance: 75Ω			
Amplitude: 800mV +/- 10%			
Rise & fall time: 270Mb/s: 400-800ps, 1.5 & 3Gb/s: 135ps or less			
DC offset: 0.0V +/- 10%			
Overshoot: 10% or less			
Jitter: 0.2 UI or less Alignment (up to 3G), 2UI or less Timing (up to 270M),			
1UI or less Timing (1.5G), 2UI or less Timing (3G)			
Return loss: Per SMPTE 2082-1			
SFP aux port: 2x			
Embedded Audio Specifications			
Audio channels per I/O: 16			
3.1.1.6 Input Framesync License	ROSS	ULTRISYNC	6
Specification			
License for Input Framesync			
3.1.1.7 Output Multiviewer License	ROSS	ULTRISCAPE	5
Specification			
License for Output Multiviewer License			
3.1.1.8 Fiber 1300nm Multi Mode Transceiver SFP	ROSS	SFP-MADI-1300MM	2
Specification			
Industry SFP package			
LC duplex connector interface			
Suitable for AES10 transmission and receiving			
Operates with 50/125μm and 60/125μm multi-mode fiber			
Hot-pluggable			
3.1.1.9 Ultrisc SRC and Audio Delay on MADI License	ROSS	ULTRISRC	2
Specification			
License for Ultrisc SRC and Audio Delay on MADI			
3.1.1.10 3G SDI HD-BNC Transceiver SFP	ROSS	SFP-HDB-IO-3G	10
Specification			
SMPTE 424M, SMPTE 292M, and SMPTE 259M compliant			
HD-BNC 75Ω connectors			
Equalizes 400m at 270Mbps			
Supports DVB-ASI at 270Mbps			
Supports video pathological patterns for SD-SDI, HD-SDI, and 3G-SDI			
Hot-pluggable			
3.1.2 Multi Viewer	Decimator Design	DD-6S	2
Specification			
SDI Input & Output Formats: including followings			
3G:SMPTE 424M@2.97 and 2.967Gb/s			
1080p@60/59.94/50Hz			

HD:SMPTE 292M/274M/296M@1.485 and 1.435Gb/s			
1080i@60/59.94/50Hz			
1080p/psf@30/29.97/25/24/23.98Hz			
720p@60/59.94/50/30/29.97/25/24/23.98Hz			
SD:SMPTE 259M@270Mb/s			
625i50			
525i59.94			
HDMI Output Formats: including followings			
1080p@60/59.94/50Hz			
1080i@60/59.94/50Hz			
1080p@30/29.97/25/24/23.98Hz			
720p@60/59.94/50/30/29.97/25			
625i50 / 525i59.9			
LCD / Button Menu Options: including followings			
HDMI output type			
Output Select			
Multi-Viewer Output Format			
Multi-Viewer Number of Windows			
Multi-Viewer Layout			
Multi-Viewer Audio Source			
Multi-Viewer Reference			
Full Screen is Scaled			
Input Routing			
GPI mode			
Setup			
Input: including followings			
6 x (3G/HD/SD)-SDI			
Input Equalization: 100m using Belden 1694A			
USB for control and updates			
Output: including followings			
6 x SDI (3G/HD/SD)-SDI Active Loop-throughs			
2 x SDI (3G/HD/SD)-SDI			
HDMI Type A			
LED Status: including followings			
Power			
6 x Signal lock and rate			
Dimensions:			
Length: 220mm or less			
Width: 104mm or less			
Height: 30mm or less			
Power supply: +5V to +3.2V DC			
Accessories: Manufacturer standard accessories			
3.2 VIDEO SWITCHER			
3.2.1 Multi Format Switcher	SONY	XVS-G1	1
<p>HD/1080p Mode: 24 In /12 Out, 4ME, 16 Keyers, 16Ch Frame memory, Frame Sync: All input, MultiViewer: 2 out 4K/UHD Mode: 24 In /12 Out, 2ME, 4 Keyers, 6Ch Frame memory, Frame Sync: All input, MultiViewer: 1 out (4K or HD)</p> <p>System Format 4K 3840x2160/59.94P, 3840x2160/50P, 3840x2160/29.97P, 3840x2160/25P, 3840x2160/24P, 3840x2160/23.98P HD 1080/59.94P, 1080/50P, 1080/29.97PsF, 1080/25PsF, 1080/24PsF, 1080/23.98PsF, 1080/59.94i, 1080/50i, 720/59.94P, 720/50P</p> <p>Video inputs/outputs Inputs (BNC) 24 inputs Outputs (Max) (BNC) 12 outputs Signal format SMPTE 259M-C, 292M, 424M, ST425-1, ST 2082-1 Signal Processing 4 : 2 : 2 digital component Quantization 12G/3G/HD/SD-SDI : 10-bit Reference Reference input BNC (x2), 75 Ω with loop-through output HD tri-level sync or Analog black burst Reference output BNC (x1), 75 Ω output HD tri-level sync or Analog black burst Control LAN 1 RJ-45 (x1), 1000BASE-T LAN 2 RJ-45 (x1), 1000BASE-T GPI D-sub 25-pin (x1), open collector outputs 16 ch, 3.3V TTL input 6ch USB USB 2.0 (x2), USB 3.0 (x2) for maintenance only TALLY/GPI D-sub 25-pin (x1), open collector outputs 16 ch, 3.3V TTL input 6ch</p>			

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<p>General Power requirement AC 100 V to 127 V, 50/60Hz AC 200 V to 240 V, 50/60Hz Power consumption 100 V to 127 V : 7 A to 5.5 A 200 V to 240 V : 3.4 A to 2.8 A (when equipped with all installable option boards) Operating temperature 5 °C to 40 °C Storage temperature - 20 °C to 60 °C Operating humidity 10 % to 90 % Dimensions (W x H x D) 440 x 176 x 583 mm Mass Approx. 21 kg (when equipped with all installable option boards)</p>			
3.2.2 Legacy Interface Option	SONY	XKS-G1700	1
3.2.3 Rack Mount Kit	SONY	RMM-1100	1
3.2.4 GPU processor card	SONY	XKS-G1600	1
3.2.5 Clip Player Licence - 4 CH Clip player	SONY	XZS-G1800	1
3.2.6 2 M/E 24 XPT Button Control Panel	SONY	ICP-X1224	1
<p>General Power requirement: DC IN-A/B : DC 19.5 V Power consumption: DC 2.1 A Operating temperature: 5°C to 40°C Dimensions (W x H x D): 912.0 mm x 438.5 mm x 94.7 mm Mass: Approx. 15.0 kg Control LAN-A1: RJ-45 (x1), 1000BASE-T LAN-A2: RJ-45 (x1), 1000BASE-T LAN-B: RJ-45 (x1), 1000BASE-T</p>			
3.2.7 16 Button remote control panel	SONY	MKS-R1620	1
<p>General Power supply: 37V, 57V (PoE), DC IN 12V Current consumption: (PoE), 0.7A DC Dimensions (W x H x D): 440 x 43.6 x 90 mm MassApprox: . 1.3kg Temperature ranges: Operational temperature: +5°C~+40°C Storage temperature: -20°C~+60°C LAN: RJ-45 (x2) (PoE x1) 1000BASE-T</p>			
3.3 REPLAY			
3.3.1 Replay Server	RIEDEL	RM-R84-5x2TB	2
<p>Replay server 2 RU ,5x2TB SSD RAID storage (up to 100h), 8x 3G SDI I/O or 4x 12G SDI. Redundant PSU 110/230V. Multi-user Workflow - Up to 2 Users (option), 6in/2out for Single User in HD, and 2 in / 2 out in UHD Video Standard - 720p, 1080i and 1080p, 10-bit in HD and 2160p in UHD Codec: DNxHR 120/145/185/220Mbps in HD and DNxHR 920/1100Mbps in UHD, Embedded Audio - 16 trks. per channel, 1x UI Mini PC included - Intel Core i7, 2.8GHz, 16GB RAM, 250G SSD Network - 2x 1 Gigabit RJ45 Ethernet ports and 2x 10 Gigabit RJ45 Ethernet ports Remote Control Unit with more than 25 functional buttons. Jog/shuttle wheel provides coarse movement and fine-tunes control for frame by frame movement. T-bar controls playback speed with high precision.</p>			
3.3.2 Xport Software for R84	RIEDEL	RM-R84-Xport	2
3.3.3 One year service agreement	RIEDEL	RM-R84-SLA	2
1Year for Riedel Care Service Level Agreement (R84)			
3.4 RECORDER			
3.4.1 Four Channel HD Recorder	AJA	KI-PRO-ULT-12G	2
Specification			
Video Formats: including followings			
Single Channel Mode:			
(4K) 4096 x 2160p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(4K) 4096 x 2160PsF 23.98, 24, 25, 29.97			
(UltraHD) 3840 x 2160p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(UltraHD) 3840 x 2160PsF 23.98, 24, 25, 29.97*			
(2K) 2048 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(HD) 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(HD) 1080i 25, 29.97, 30			
(HD) 1080PsF 23.98, 24, 25, 29.97			
(HD) 720p 50, 59.94, 60			
Multi-Channel Mode:			
(HD) 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(HD) 1080i 25, 29.97, 30			
(HD) 1080PsF 23.98, 24, 25, 29.97			
(HD) 720p 50, 59.94, 60			

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Codec Support: including followings			
Single Channel Mode:			
Apple ProRes 4444 XQ, up to 2K/60 fps			
Apple ProRes 4444, up to 30 fps			
Apple ProRes 422 (HQ)			
Apple ProRes 422			
Apple ProRes 422 (LT)			
Apple ProRes 422 (Proxy)			
Avid DNxHD HQX (220x)*			
Avid DNxHD SQ (145)			
Avid DNxHD LB (36)			
Avid DNxHR HQX up to 4K/29.97 fps			
Avid DNxHR SQ up to 4K/29.97 fps			
Avid DNxHR LB up to 4K/29.97 fps			
Multi-Channel Mode:			
Apple ProRes 4444, up to 30 fps			
Apple ProRes 422 (HQ)			
Apple ProRes 422			
Apple ProRes 422 (LT)			
Apple ProRes 422 (Proxy)			
Avid DNxHD only supported for 1080 and 720 resolutions			
Avid DNxHD 36 only supported for 1080p			
Codec Container: including followings			
Apple ProRes .MOV			
AVID DNX .MXF or .MOV			
Removable Storage: including followings			
2x slots, AJA SSD media PAK2000, PAK1000, PAK512, PAK256			
File System Support: including followings			
HFS+, exFAT			
Video Input Digital: including followings			
1x 12G-SDI, SMPTE-292/372/424/2081/2082			
3x 3G-SDI, SMPTE-292/372/424			
1x Fiber or HD-BNC 12G-SDI, SMPTE-297 (optional SFP modules)			
3x Fiber or HD-BNC, 3G-SDI, SMPTE-297 (optional SFP modules)			
4K/UltraHD 4:2:2 10bit & 4:4:4 10bit (BNC or Fiber)			
2K 4:2:2 10bit & 4:4:4 10/12bit (BNC or Fiber)			
Dual Link 4:2:2 10bit & 4:4:4 10/12bit (BNC or Fiber)			
Single Link 4:2:2 10bit & 4:4:4 10/12bit (BNC or Fiber)			
1x HDMI standard type A connector			
HDMI v2.0			
4:4:4 RGB 8/10/12-bit (deep color)			
4:2:2 YCbCr 8/10/12-bit			
4:2:0 YCbCr 8-bit			
Video Output Digital: including followings			
1x 12G-SDI, SMPTE-292/372/424/2081/2082			
3x 3G-SDI, SMPTE-292/372/424			
1x Fiber or HD-BNC 12G-SDI, SMPTE-297 (optional SFP modules)			
3x Fiber or HD-BNC, 3G-SDI, SMPTE-297 (optional SFP modules)			
4K/UltraHD 4:2:2 10bit & 4:4:4 10bit (12G BNC or Fiber)			
4K/UltraHD 4:2:2 10bit & 4:4:4 10bit (Quad link BNC)			
2K 4:2:2 10bit & 4:4:4 10/12bit (BNC or Fiber)			
Dual Link 4:2:2 10bit & 4:4:4 10/12bit (BNC or Fiber)			
Single Link 4:2:2 10bit & 4:4:4 10/12bit (BNC or Fiber)			
1x HDMI standard type A connector			
HDMI v2.0			
4:4:4 RGB 8/10/12-bit (deep color)			
4:2:2 YCbCr 8/10/12-bit			
4:2:0 YCbCr 8-bit			
Audio Input Digital: including followings			
16-channel, 24-bit SDI/Fiber embedded audio, 48kHz sample rate, synchronous			
8-channel, 24-bit HDMI embedded audio, 48kHz sample rate, synchronous			
8-channel, AES/EBU via (1x DB-25 TASCAM pinout)			
Audio Input Analog: including followings			
8-channel, mappable, 24-bit A/D analog audio, 48kHz sample rate (1x DB-25 TASCAM Pinout)			
+24dBu full scale digital			
+/- 0.2dB 20Hz to 20kHz frequency response			
Audio Output Digital: including followings			
16-channel, 24-bit SDI/Fiber embedded audio, 48kHz sample rate, synchronous			
8-channel, 24-bit HDMI embedded audio, 48kHz sample rate, synchronous			
8-channel, AES/EBU via (1x DB-25 TASCAM pinout)			
Audio Output Analog: including followings			
Stereo unbalanced headphone jack (1x 3.5mm jack) with volume control			
8-channel, 24-bit D/A analog audio, 48kHz sample rate (1x DB-25 TASCAM pinout)			
2-channel unbalanced 2x RCA connectors			
Recording Mode: including followings			
Multi-channel HD Apple ProRes recording (PAK2000, PAK1000, PAK512 (R1/X2 and above), PAK256 (R1/X2 and above))			
Single channel 4K/UltraHD/2K/HD recording			
Playback Mode: including followings			
One channel of 4K/UltraHD/2K/HD at a time			
Timecode: including followings			
SDI RP188/SMPTE 12M via SDI BNC			
LTC input (1x BNC)			

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LTC output (1x BNC)			
TC Super Out			
Reference Input: including followings			
External, 2x BNC			
Looping, nonterminating			
Input reference formats:			
(HD) Tri-level sync			
720p 59.94			
720p 50			
1080i 59.94			
1080i 50			
1080p 23.98			
1080PsF 23.98			
1080p 24			
1080PsF 24			
1080p 25			
1080PsF 25			
1080p 29.97			
1080PsF 29.97			
(SD) Analog composite			
525i 59.94			
625i 50			
Network Interface: including followings			
1x LAN connector (RJ-45 connector, 10/100/1000)			
Embedded web server for remote control			
Configuration and Transport Control via Web Interface			
Video Confidence Monitor via Web Interface			
Clip upload/download via Web Interface in DATA-LAN mode			
Remote control via REST			
Machine Control: including followings			
RS-422, 1x DB-9 female connector, Sony 9-pin protocol			
9-pin D-connector pinout is as follows:			
1 GND			
2 TX-			
3 RX+			
4 GND			
5 No Connection			
6 GND			
7 TX+			
8 RX-			
9 GND			
Shell GND			
User Interface: including followings			
Rotary selector knob			
Dedicated, backlit transport controls and menu buttons			
Large 1280x720 TFT LCD display with Video Monitor and Menu/Status Overlays			
Closed Captioning Support: including followings			
CEA-708, CEA-608			
Dimensions:			
Length: 270mm or less			
Width: 220mm or less			
Height: 85mm or less			
Weight: 2.6kg or less			
Power Supply:			
Dual, redundant power supply			
AC100-240V 50/60Hz (AC adapter)			
12-18Vdc 4-pin XLR (chassis)			
Power consumption: 65W or less			
Operating Temperature: 0 to 40°C or wider			
Operating Relative Humidity: 10 to 90% noncondensing or wider			
Accessories: Manufacturer standard accessories			
3.4.2 Power Supply for Redundant Power	AJA	KPU-PWR-SUPPLY	2
Specification			
Use: for 3.4.1 Four Channel HD Recorder			
3.4.3 SSD Module	AJA	PAK1000-X3	4
Specification			
Use: for 3.4.1 Four Channel HD Recorder			
Storage capacity: 1TB			
3.4.4 External Dock for SSD Module	AJA	PAK-DOCK-PRO	1
Specification			
User Interface			
USB 3.2 Gen2 for transfer speeds up to 10Gbps			
Reversible USB Type-C connector			
Operating temperature range: 0 to 40°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Depth: 60mm or less			
Width: 110mm or less			
Height: 15mm or less			
Power supply: Bus powered			

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Power consumption (idle): 0.5W or less			
Weight: 0.2kg or less			
Accessories: Manufacturer standard accessories			
3.4.5 Rack Mount Shelf	AJA	KPU-SHELF	1
Specification			
Use: Rack mount shelf for 3.4.1 Four Channel HD Recorder			
Dimensions:			
Depth: 380mm or less			
Width: 445mm or less			
Height: 90mm or less			
3.5 STREAMING			
3.5.1 Output Server (Customer Supplied)	LiveU	LU10-SV-1UL02-V2	(1)
Specification			
LU2000 Dual HD Output Server (Upgradable to Quad)			
3.5.2 Talkback Device (Customer Supplied)	LiveU	LU10-IFB-002	(1)
Specification			
IFB Talkback device (one way)			
3.5.3 Audio Connect License (Customer Supplied)	LiveU	LU-LIC-AUD-INF8	(1)
Specification			
Yearly Audio Connect license for 8 audio interfaces assigned in the station side.			
Includes 1:1 intercom bidirectional audio communication or "many to many".			
Supported on all HEVC product line and LU-Smart.			
3.5.4 Video Transmission Encoder (Customer Supplied)	LiveU	LU610S	1
Specification			
Type: HEVC Single Channel1U rack-mount video transmission Encoder Includes standard software package - supporting up to 1080p60 (SDI & HDMI), up to 8Mbps live transmission and 2 audio channels.			
Video resolutions: including 4Kp50/60/25/30/24, 1080p50/60/25/30/24, 1080i50/60, 720p50/60, PAL, NTSC			
Video interfaces: including 12G/3G/HD/SD-SDI + HDMI 2.0			
Video encoder: including H.265/HEVC, H.264, 1x video channel up to 4K			
Audio encoder: including AAC-HE/LC – up to 8 audio channels			
Simultaneous bonding: including followings			
Up to 3 connections			
2x Ethernet ports for connection to wired internet and satellite (BGAN/KU over IP), WiFi			
Operational Modes: including followings			
Live: ultra-low latency transmission			
Live & store: live streaming with local high-quality recording on unit			
Store & forward: stream in three quality-levels (for optimal quality vs speed)			
FTP: bonded file transfer			
Data Bridge: high-speed mobile broadband connectivity from the unit			
Video return: sub-second video return over an external HDMI			
Audio connect intercom			
Auto power up: Power-on feature suitable for automatic vehicle operation (power-on with vehicle)			
Network interfaces: including 2x RJ-45 Ethernet ports and 2.4/5GHz WiFi (802.11 a/b/g/n/ac)			
Other interfaces: including followings			
2x USB 2.0			
3.5mm audio jack			
min-XLR audio out			
full size SD card slot			
full size HDMI out.			
Antennas ports: 2x RP-SMA Wi-Fi + 12x SMA for cellular			
Dimensions:			
Length: 280mm or less			
Width: 436mm or less			
Height: 45mm or less			
Weight: 5kg or less			
Power: Dual power source AC100-240V 50/60Hz			
Accessories: Manufacturer standard accessories			
3.5.5 3G/4G Antenna	LiveU	ANT00026	1
Specification			
Type: External dual band cellular antenna			
Antenna gain : 3dBi or more			
Number of internal cellular antenna: 2			
Antenna cable length: 3 m or longer			
Connector type at cable end: SMA			
3.6 GRAPHIC SYSTEM			
3.6.1 Graphic System	ClassX	LBStation 4K	1
Specification			
Graphic System 19" 4RU Rack mountable, 4K READY.			
SDI Video Inputs: including			
2x 12Gb/s SD/HD/2K/4K. Supports single/dual link 4:2:2/4:4:4. 2D/3D switchable,			
SDI Video Outputs: including			
2x 12Gb/s SD/HD/2K/4K. Supports single/dual link 4:2:2/4:4:4. 2D/3D switchable,			
Analog Video Inputs: including			

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1x Component YUV on 3x BNCs switchable to S-Video or Composite. Component supports HD and SD, Analog Video Outputs: including 1x Component YUV on 3x BNCs switchable to S-Video and Composite. Component supports HD and SD, Analog Audio Inputs: including 2x Channels of professional balanced analog audio via XLR connectors, Analog Audio Outputs: including 2x Channels of professional balanced analog audio via XLR connectors. AES/EBU Audio Inputs 2x Channels unbalanced with sample rate converter. Turnkey solution, ready to start. Full set of Plugins: including followings Full LB Plugins: Chart, Clock, Content Layout, Digital Clock, Image, Karaoke, Timer, Media Player, Media Text, Screen Capture, Shape, Shared Frame, Simple Media Player, Slide Show, Video Input Source, Styled Ticker, Text Show and Ticker. Full Script support for complex graphic automations. Advanced scripting Advanced scripting environment, open to customization. No limits to the numbers of plugins Parallel playout of more than 1x Template content. Basic remote TCP/IP Control.			
3.6.2 Encoder/Decoder	Kiloview	N3-S	1
Specification			
Type: 3G-SDI NDI Bi-Directional Video Encoder/Decoder			
Video Input: 1 x SDI input			
Video Output: 1 x SDI output (loop-through or decode output)			
Audio port: 1 x 3.5mm,			
Network: 1 x RJ45 1000Mbps Ethernet port (with PoE)			
Video resolution Up to 1080p60 (backward compatible with SD/HD/VESA) or better			
NDI codec capacity: 1x NDI encoding or 1xNDI decoding			
NDI codec feature: FULL NDI HD encoding, typical bitrate: 125Mbps@1080p60			
LED indicator: including Tally light, power light and status connection light			
Power: PoE, DC, D-Tap (camera) optional. 5-18V wide range supported			
PTZ Control: Network PTZ and Serial Port,			
Management: Web UI			
Operating Temperature: -20 to 45°C or wider			
Dimensions: 100 x 80 x 24mm			
Power consumption: 6W or less			
3.6.3 Template Editor	ClassX	CGEditSuite HD v.8	1
Specification			
Template editors with integrated Data Source Editor: 2D vector graphic template editor + bitmap 2.5D graphic template editor (on separate dongle).			
The types of data sources are: txt, csv, xls, rss, database (MYSQL, SQLSERVER, ORACLE SQL, MSACCESS), Social Network, JSON, XML, manual			
3.6.4 Sports Graphics	ClassX	SportsGraphics Soccer v.8	1
Specification			
Dedicated software to the manual handling of a soccer match that allows the broadcasting of real-time graphics such as ranking, results, team members, etc.			
Templates included,			
Import formation from CSV file,			
Support of static and animated team flags.			
Show player information: name, surname, rule, picture, achievements, etc.,			
Game timer, result and penalties,			
Number, name, surname, rule, image,			
Next matches list management,			
Match credits management,			
Players substitution management,			
Complete and partial match statistics,			
Referees management,			
Tactical module and substitutes,			
Team coach's management,			
Player caution management,			
Goal scorer management,			
Team coach's management,			
Player sending off management			
3.6.5 Sports Graphics	ClassX	SportsGraphics Basket v.8	1
Specification			
SportsGraphics Basket v.8			
Software for automatic broadcasting of dates to basket match. The dates are directly take from remote protocol from Bertele's console through serial port.			
Import formation from CSV file,			
Templates included,			
Support of static and animated team flags,			
Player caution management,			
Timer, result and penalties,			
Number, name, surname, rule, image, etc.			
Players info management,			
Player sending off management,			
Complete and partial match statistics,			

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Match credits management (About commentary, producer, etc.)			
Team coach's management,			
Current matches results,			
Player statistics management,			
Guests instruction management,			
Next matches list management,			
Automatic/Manual statistics.			
3.6.6 Picture in Picture Software	ClassX	PiP + DVE	1
Specification			
Multi-channel Picture in Picture software option with digital video effects (DVE).			
3.7 vMix SOFTWARE			
3.7.1 vMix Software 4K LIFETIME LICENSE (Customer Supplied)	vMix	vMix 4K	(1)
Specification			
Software type: Live production software to record and stream productions from workstation			
3.7.2 PC (Customer Supplied)	DELL	Precision 3660	(1)
Specification			
Intel Corei7-12700K, 12 Cores, 20 Threads			
SSD: 512GB, NVMe, M.2			
HDD: 3,5" SATA 1TB			
GPU: NVIDIA RTX A4000, 16GB			
RAM: 32GB (2x16)			
NIC: 2x RJ45 1G Ethernet			
Keyboard and Mouse			
OS: Windows 10 Pro			
3.7.3 Blackmagic Design DeckLink 8K Pro	Black Magic Design	BDLKHCPRO8K12G	1
Blackmagic Design DeckLink 8K Pro 4 x bi-directional 12Gb/s SD/HD/2K/4K/8K. Supports single, dual link and quad link 4:2:2/4:4:4			
3.7.4 Studio Controller	Elgato	MK2	1
Specification			
Studio Controller			
15 customizable LCD keys			
Interface: USB 2.0			
Dimensions: 118 x 84 x 25mm			
3.7.5 USB Extender	Techly	IUSB-EXTENDY2	1
Specification			
Type: USB extender on CAT5E/6 60m			
Maximum length: 60m or more			
Transfer speed: 12Mbps or more			
Bus powered: no external power supply required			
3.8 GLUE			
3.8.1 Modular Frame	ROSS VIDEO	OGX-FR-CN	4
Specification			
High Density Modular Frame			
Robust power supply with integral cooling			
Advanced Ethernet based frame controller with GigE to every slot			
Optional SNMP control and monitoring			
2RU frame houses up to 20 Processing cards			
Supports any mix of analog, digital, video and audio modules in the same frame			
Modular I/O panels for connector flexibility			
Removable front door for easy fan servicing			
Frames come standard with cooling			
Front LCD display for name, IP and fault identification			
2 independent looping references with connection to each card slot			
Optional redundant power supply, hot-swappable			
3.8.2 Support Bracket	ROSS VIDEO	FSB-OGX	4
Specification			
Rear support brackets for high density modular frame, extends to 30 inches from frame			
3.8.3 Power Supply	ROSS VIDEO	PS-OGX	4
Specification			
Additional Universal Power Supply for High Density Modular Frame			
3.8.4 Distribution Amplifier	ROSS VIDEO	UDA-8705A-R2L	6
Specification			
Analog Video Distribution Amplifier			
Analog Input: 1x 75Ω BNC connector			
Return loss: 43dB to 5MHz, 35dB to 20MHz			
Amplitude: 1Vp-p			
Analog Outputs: 8x plus 1 looping 75Ω BNC connector			
Return loss: 45dB or more to 5MHz, 41dB or more to 20MHz			
Isolation: 51dB or more to 5MHz, 40dB or more to 20MHz			
DC Offset: 30mV or less			
Frequency Response: ±0.08dB - 10MHz, ±0.2dB - 20MHz or wider			
Performance			

Gain Range: ±3dB or wider			
Delay: PAL: 7ns (11° at 4.43MHz) or less			
Bandwidth: -3dB 56MHz Typical			
Total Power Draw: 1.5W or less			
3.8.5 Multiplexer	ROSS VIDEO	AMX-8952-B	2
Embed or de-embed 8 AES Channels (16 Discrete Channels) into a HD/3G / 12G-SDI Video Stream . Audio processing includes sum, swap, invert, shuffle, gain, delay , and SRC. Standard support for HD formats, optional UHD format support. Optional Frame synchronizer and delay.			
GENERAL Video Interface: • HD-BNC: 1 in, 1 out, 1 bidirectional Standards: • HD-SDI (SMPTE ST 274) • 3G-SDI (SMPTE ST 424) • 12G-SDI (SMPTE ST-2081-1) Format Support: • 720p 50/59.94 • 1080i 50/59.94 • 1080p 23.98/25/29.97/50/59.94 • 2160p 50/59.94 Video Delay: • HD/3G: 0 – 160 frames • UHD: 0 – 40 frames			
SDI Inputs Cable Length (Belden 1694a): • HD-SDI: 150m • 3G-SDI: 120m • 12G-SDI: 50m Input Return Loss: • >15dB to 1.5GHz • >10dB to 3GHz • >4dB to 12GHz Impedance: 75Ω			
SDI Outputs Output Return Loss: • >15dB to 1.5GHz • >10dB to 3GHz • >4dB to 12GHz Rise/fall Time: • <270ps @ 1.485Gbps • <135ps @ 2.97Gbps • <45ps @ 11.88Gbps Alignment Jitter: • 1.485Gbps: <0.2 UI • 2.97Gbps: <0.3 UI • 11.88Gbps: <0.3 UI Output Level: 800mV ± 10% DC Offset: 0V ± 50mV Overshoot: • <10% @ 1.485 Gbps • <10% @ 2.97 Gbps • <15% @ 11.88Gbps			
AES I/O (AMX-8952-B) Physical: 8 bidirectional WECCO Standards: AES-3id-2001 AES Inputs Impedance: 110Ω Input Level: 100mV – 10V p-p @ 48kHz Sampling Rate: 32kHz – 96kHz Minimum Audio Delay: 0.37ms Cable Length: 450m @ 48kHz AES Outputs Impedance: 110Ω Input Level: 4V p-p Sampling Rate: 48kHz			
3.8.6 Distribution Amplifier	ROSS VIDEO	SRA-8802-R2R	2
Specification			
Single 3G/HD/SD SDI Distribution Amplifier			
Equalizes and reclocks 3G/HD/SD SDI signals			
Non-inverting outputs			
A/B input failover protection (optional rear module)			
Automatic detection of incoming data rate			
Standard and split rear module I/O options			
Optional bypass relay (optional rear module)			
SDI Input: 1x 3G/HD/SD SDI, 75Ω BNC connector			
Return loss: 14dB or more to 1.485GHz, 7.8dB or more to 3GHz			
SDI Outputs: 8x plus 1 bypass 3G/HD/SD SDI, 75Ω BNC connectors			
Return loss: 15dB or more to 1.485GHz, 10dB or more to 2.97GHz			
Signal Level: 800mV, +/- 10%			
DC Offset: 0V ±50mV			
Total Power Draw: 2.8W or more			
3.8.7 Distribution Amplifier	ROSS VIDEO	DRA-8902-10	5

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Specification			
Dual 12G/3G/HD/SD SDI Distribution Amplifier with Input Failover			
Up to 2 independent channels of SDI distribution on one card			
Equalizes 12G/3G/HD/SD SDI signals			
Non-inverting outputs			
Auto or Manual Failover to Secondary input			
Output routing Support			
Automatic detection of incoming data rate			
SDI Input: 2x 12G/3G/HD/SD SDI, 75Ω HD BNC connector			
Return loss: 15dB or more to 1.485Gb, 10dB or more to 2.97Gb, 4dB or more to 11.88Gb			
SDI Outputs: 10x 12G/3G/HD/SD SDI, 75Ω HD BNC connectors			
Return loss: 15dB or more to 1.485Gb, 10dB or more to 2.97Gb, 4dB or more to 11.88Gb			
Signal Level: 800mV, +/- 10%			
DC Offset: 0V ±50mV			
Total Power Draw: 5.6W or more			
3.8.8 Distribution Amplifier	ROSS VIDEO	DRA-8804-R2	3
Specification			
Dual 3G/HD/SD SDI Distribution Amplifier			
Equalizes and reclocks 3G/HD/SD SDI signals			
Non-inverting outputs			
A/B input failover protection (optional rear module)			
Automatic detection of incoming data rate			
Standard and split rear module I/O options			
Optional bypass relay (optional rear module)			
SDI Inputs: 2x 3G/HD/SD SDI, 75Ω BNC connector			
Return loss: 15dB or more to 3GHz			
SDI Outputs: 4x per channel 3G/HD/SD SDI, 75Ω BNC connectors			
Return loss: 15dB or more to 1.485GHz, 10dB or more to 2.97GHz			
Signal Level: 800mV, +/- 10%			
DC Offset: 0V ±50mV			
Total Power Draw: 3W or more			
3.8.9 Distribution Amplifier	ROSS VIDEO	ADA-8405-C	4
Specification			
Analog Audio and Timecode DA			
Dual 1x4 or single 1x8 analog audio distribution			
+/- 15dB software gain control			
Summing capability			
Low distortion			
1x4 or 1x8 timecode (LTC) distribution			
Analog Input: 1x 20KΩ, balanced WECO connector			
Maximum Input Level: +27.5dBu or more			
Analog Outputs: 4x 66Ω, balanced WECO connector			
Maximum Output Level: +27dBu or more			
Isolation: 60dB or more			
Performance			
Gain: -15dB to +15dB or wider			
Frequency Response: ±0.1dB from 20Hz to 20kHz or wider			
Noise: -85dBu or less, 10kHz to 22kHz at unity gain			
Inter-channel Crosstalk: 90dB or less 20Hz to 20kHz			
Harmonic Distortion: 0.01% or less			
Total Power Draw: 4.5W or more			
3.8.10 Distribution Amplifier	ROSS VIDEO	ADA-8405-C-R2CS	4
Specification			
Analog Audio and Timecode DA			
Dual 1x4 or single 1x8 analog audio distribution			
+/- 15dB software gain control			
Summing capability			
Low distortion			
1x4 or 1x8 timecode (LTC) distribution			
Analog Input: 1x 20KΩ, balanced WECO connector			
Maximum Input Level: +27.5dBu or more			
Analog Outputs: 4x 66Ω, balanced WECO connector			
Maximum Output Level: +27dBu or more			
Isolation: 60dB or more			
Performance			
Gain: -15dB to +15dB or wider			
Frequency Response: ±0.1dB from 20Hz to 20kHz or wider			
Noise: -85dBu or less, 10kHz to 22kHz at unity gain			
Inter-channel Crosstalk: 90dB or less 20Hz to 20kHz			
Harmonic Distortion: 0.01% or less			
Total Power Draw: 4.5W or more			
3.8.11 Distribution Amplifier	ROSS VIDEO	ADA-8402-B	3
Specification			
AES / EBU Reclocking Distribution Amplifier			
1x4 or 1x8 AES distribution amplifier			
Cable equalization and data reclocking on the incoming			
AES / EBU signal			
Provides level matching and level control of output signals			
AES Input: 1x AES-3 110Ω balanced WECO connector			

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Sampling Rates: All rates from 32kHz to 96kHz			
Input Level: 0.2-7Vp-p or wider			
AES Outputs: 4x AES-3 110Ω balanced WECO connector			
Resolution: 24Bit			
Return Loss: -25dB or more			
Output Jitter: 5ns or less			
Output Level: 2.5Vp-p nominal			
3.8.12 Distribution Amplifier	ROSS VIDEO	ADA-8402-B-R2BS	3
AES / EBU Reclocking Distribution Amplifier 1x4 or 1x8 AES distribution amplifier Cable equalization and data reclocking on the incoming AES / EBU signal Provides level matching and level control of output signals AES Input: 1x AES-3 110ohm balanced WECO connector Sampling Rates: All rates from 32kHz to 96kHz Input Level: 0.2-7Vp-p AES Outputs: 4x AES-3 110ohm balanced WECO connector Resolution: 24Bit Return Loss: -25dB Output Jitter: <5ns Output Level: 2.5Vp-p nominal Total Power Draw: >2.2W			
3.8.13 Distribution Amplifier	ROSS VIDEO	WDA-8409-R2L	1
Specification			
Word Clock Distribution Amplifier			
Word Clock Input: 1x 75Ω BNC connector			
Sensitivity: 200mV or less			
Word Clock Outputs: 8x plus 1 looping 750Ω BNC connector			
Level: 5V p-p square wave (terminated into 75Ω)			
Total Power Draw: 2W or less			
3.8.14 Frame Synchronizer	AJA	FS-4	2
Specification			
Modes of Operation: including followings			
Four channel mode: 4x Independent 2K, HD, or SD video processors			
Single channel mode - 1x 4K, UltraHD, 2K, HD, or SD video processor			
Enhanced single channel mode - 1x 4K, UltraHD video processor with simultaneous 4K/UltraHD and 2K/HD/SD outputs			
Video Formats: including followings			
(4K) 4096 x 2160p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(4K) 4096 x 2160PsF 23.98, 24, 25, 29.97, 30			
(UltraHD) 3840 x 2160p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(UltraHD) 3840 x 2160PsF 23.98, 24, 25, 29.97, 30			
(2K) 2048 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(HD) 1920 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(HD) 1920 x 1080PsF 23.98, 24, 25, 29.97, 30			
(HD) 1920 x 1080i 50, 59.94, 60			
(HD) 1280 x 720p 50, 59.94, 60			
(SD) 625i 50 • (SD) 525i 59.94			
YCbCr, 4:2:2, 10-bit			
Video Input Digital: including followings			
4x 3G-SDI inputs, 4x BNC			
4x 12G-SDI inputs, 4x Fiber or HD-BNC (optional SFP modules)			
SFP coax module, 12G/6G-SDI, dual HD-BNC			
SFP fiber module, 12G/6G-SDI, Single Mode, dual LC or single LC, SMPTE 297			
SFP fiber module, 3G-SDI, Single Mode, dual LC, single LC, or single SC, SMPTE 297			
SFP fiber module, 3G-SDI, Multi-Mode, dual LC or single LC, SMPTE 297			
12G/6G/3G/HD/SD, SMPTE 259/292/424/2081/2082			
Single link 12G/6G-SDI (with optional SFP module)			
Quad link 3G-SDI level A or B DL (4x 3G), SMPTE 425-5			
Dual link 3G-SDI level B DS (2x 3G), SMPTE 425-3			
Single link 3G-SDI level A, B DL, or B DS, SMPTE 425			
Quad link HD-SDI (4x 1.5G)			
Dual link HD-SDI (2x 1.5G), SMPTE 372			
Single link HD/SD			
Quadrant (Square Division) or 2SI (Two Sample Interleave) 4K/UltraHD input pixel mapping			
8x 1 selector feeds video processor(s)			
Video Output Digital: including followings			
4x 3G-SDI outputs, 4x BNC			
4x 12G-SDI outputs, 4x fiber or HD-BNC (optional SFP modules)			
SFP coax module, 12G/6G-SDI, dual HD-BNC			
SFP fiber module, 12G/6G-SDI, Single Mode, dual LC or single LC, SMPTE 297			
SFP fiber module, 3G-SDI, Single Mode, dual LC, single LC, or single SC, SMPTE 297			
SFP fiber module, 3G-SDI, Single Mode, dual LC, SMPTE 297			
SFP fiber module, 3G-SDI, Multi-Mode, dual LC or single LC, SMPTE 397			
12G/6G/3G/HD/SD, SMPTE 259/292/424/2081/2082			
Single link 12G/6G-SDI (with optional SFP module)			
Quad link 3G-SDI level A or B DL (4x 3G), SMPTE 425-5			
Dual link 3G-SDI level B DS (2x 3G), SMPTE 425-3			

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Single link 3G-SDI level A, B DL, or B DS, SMPTE 425			
Quad link HD-SDI (4x 1.5G)			
Dual link HD-SDI (2x 1.5G), SMPTE 372			
Single link HD/SD			
Quadrant (square division) or 2SI (two sample interleave) 4K/UltraHD output pixel mapping			
Monitor Output Digital: including followings			
Monitor output is a copy of the Main output			
1x BNC, 1x 3G-SDI output			
3G-SDI/HD/SD, SMPTE 259/292/424, 10-bits			
4K/UltraHD automatically down-converted to 2K/HD			
SDI Monitor output is configurable when system is operating in enhanced single channel node			
Video formats			
(2K) 2048 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(HD) 1920 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(HD) 1920 x 1080PsF 23.98, 24, 25, 29.97, 30			
(HD) 1920 x 1080i 50, 59.94, 60			
(HD) 1280 x 720p 50, 59.94, 60			
(SD) 625i 50			
(SD) 525i 59.94			
1x HDMI, 1x HD output			
2K/HD/SD, HDMI v1.4a			
4K/UltraHD automatically down-converted to 2K/HD			
HDR Infoframe generation to support HDR displays per HDMI v2.0b and CTA-861-G			
Crop control			
Video Processing: including followings			
Motion adaptive deinterlacer			
Proc amp controls			
Color corrector			
Legalizer			
Frame rate conversion/film cadence removal/insertion (3:2, 1:2, 2:1, 2:3)			
Adjustable delay 0-20 frames with H and V timing controls in lines and pixels			
Freeze (manual or on input signal loss) to black or last good frame			
Matte generator for background fill			
Video test generator with SDR and HDR patterns			
Nominal video delay HD/SD, 2 frames (LFR), 4 frames (HFR)			
Ancillary Data: including followings			
All embedded ANC packets pass-through when output format equals input format			
Ancillary timecode (LTC, VITC1, VITC2) translation and pass-through for wide range of conversions			
SCTE-104 and closed captioning pass-through for wide range of conversions			
Closed captioning conversion (CEA-608/CEA-708)			
AFD input detection, down-convert control, and output pass-through or overwrite			
Configurable SDI output VPID for colorimetry and transfer characteristic			
Format Conversion: including followings			
Convert any supported input format to any supported output format, within the same frame rate family. These three families are:			
59.94, 29.97, 23.98			
50, 25			
60, 30, 24			
Scaling: including followings			
Supported in 2K/HD/SD formats			
Zoom in and out			
Reposition			
Region of Interest (ROI)			
Up-Conversion: including followings			
Hardware 10-bit			
Zoom 14:9: results in a 4:3 image zoomed slightly to fill a 14:9 image with black side bars			
Zoom Letterbox: results in image zoomed to fill full screen			
Zoom Wide: results in a combination of zoom and horizontal stretch to fill a 16:9 screen; this setting will introduce a small aspect ratio change			
Down-Conversion: including followings			
Hardware 10-bit			
Anamorphic: full screen			
Letterbox: image is reduced with black top and bottom added to image area with the aspect ratio preserved			
Crop: image is cropped to fit video output format			
Aspect Ratio Conversion for SD to SD			
Letterbox: Transforms SD anamorphic material to a letterboxed image			
H Crop: Produces a horizontally stretched effect on the image; transforms anamorphic SD to full frame			
SD Pillar box: Produces an image in the center of the screen with black borders on the left and right sides and an amorphized image in the center			
V Crop: Transforms SD letterbox material to an anamorphic image			
Audio Input Digital: including followings			
48kHz sample rate			
8x SDI embedded inputs (16-Channels each)			
128-channels, 24-bit (20-bit SD), SMPTE 272/299			
8x balanced AES inputs (16-channels), 1x DB-25			
16-channels, 24-bit, AES-3			
2x MAD1 inputs, 1x BNC, 1x ST Fiber			
128-channels, 24-bit, AES-10			

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Audio Output Digital: including followings			
48kHz sample rate			
1x SDI embedded output per Video Processor (16-Channels each)			
16-channels (in single Video Processor mode), 24-bit (20-bit SD), SMPTE 272/299			
64-channels (in four Video Processor mode), 24-bit (20-bit SD), SMPTE 272/299			
8x balanced AES outputs (16-channels), 1x DB-25			
16-channels, 24-bit, AES-3			
2x MAD I outputs, 1x BNC, 1x ST Fiber			
128-channels, 24-bit, AES-10			
Audio Processing: including followings			
277 x 208 mono audio matrix, route 1 to 1, 1 to many			
Inputs: 128 embedded, 16 AES, 128 MAD I, 2 stereo mixdowns, 3 tone generator			
Outputs (Four Channel Mode): 16 AES, 128 MAD I, 64 embedded			
Outputs (Single Channel Mode): 16 AES, 128 MAD I, 16 embedded			
Input adjustment controls for each channel			
Gain +18 to -18dB in 0.5dB steps			
Phase invert			
Input adjustment controls for each channel pair			
Delay -16ms to +1sec in 20.8 us steps			
Audio delay can automatically follow video timing delay adjustments			
Two independent 5.1 or 7.1 to stereo mixdown processors with gain adjust			
High quality Sample Rate Conversion (SRC) supported on all audio inputs			
SRC bypass for non-PCM audio (e.g. Dolby E, AC-3, etc.)			
Audio tone generator (mute, 400Hz, 1kHz)			
Reference Input: including followings			
External, 2x BNC			
Looping, nonterminating			
Blackburst or tri-level sync			
Genlock: including followings			
Lock to External Reference			
Lock to SDI input 1 thru 8			
Free run based on Temperature Compensated Crystal Oscillator			
Network Interface: including followings			
1x RJ-45, 10/100/1000 Ethernet			
Embedded web server for remote control			
REST Interface			
SNMP			
Front Panel: including followings			
Display			
Keypad with status LEDs			
Two rotary/push knobs			
Comprehensive alarm indicators			
Presets: including followings			
Four Channel and Single Channel Mode each support 40 system level Presets			
GPI: including followings			
1x 25-pin D-Connector			
Four optically isolated GPI inputs			
Four optically isolated GPO outputs			
Operating temperature range: 0 to 40°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Depth: 407mm or less			
Width: 445mm or less			
Height: 45mm or less			
Weight: 3.6kg or less			
Power supply: AC100-240V 50/60Hz (Dual, redundant power supplies)			
Power consumption: 70W or less			
Accessories: Manufacturer standard accessories			
3.8.15 12G/6G-SDI Dual Coax HD-BNC Receiver	AJA	HDBNC-2RX-12G	2
12G/6G-SDI Dual Coax HD-BNC Receiver			
3.8.16 12G/6G-SDI Dual Coax HD-BNC Transmitter	AJA	HDBNC-2TX-12G	2
12G/6G-SDI Dual Coax HD-BNC Transmitter			
3.8.17 Converter	Decimator	DD-12G-CROSS	6
4K HDMI/SDI Cross Converter w/ Scaling & Frame Rate Conversion			
SDI FORMATS			
12G: SMPTE 2048-1/2036-1@11.88 and 11.868Gb/s			
• (3840 or 4096) x 2160p@60/59.94/50Hz			
6G: SMPTE 2048-1/2036-1@5.94 and 5.934Gb/s			
• (3840 or 4096) x 2160p@30/29.97/25/24/23.98Hz			
3G-A or 3G-B: SMPTE 424M@2.97 and 2.967Gb/s			
• (1920 or 2048) x 1080p@60/59.94/50Hz			
HD: SMPTE 292M/274M/296M@1.485 and 1.435Gb/s			
• 1920 x 1080i@60/59.94/50Hz			
• (1920 or 2048) x 1080p/psf@30/29.97/25/24/23.98Hz			
• 1280 x 720p@60/59.94/50/30/29.97/25/24/23.98Hz			
SD: SMPTE 259M@270Mb/s			
• 720 x 576 (PAL)			
• 720 x 480i@59.94 (NTSC)			

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<p>INPUTS</p> <ul style="list-style-type: none"> • 1 x HDMI Type A • 1 x (12G/6G/3G/HD/SD)-SDI • 1 x Genlock <p>OUTPUTS</p> <ul style="list-style-type: none"> • 1 x HDMI Type A • 2 x (12G/6G/3G/HD/SD)-SDI Re-clocked Loop-through • 2 x (12G/6G/3G/HD/SD)-SDI <p>POWER</p> <ul style="list-style-type: none"> • +5V to +32V DC • Positive Centre Pin <p>DIMENSIONS</p> <p>106mm x 130mm x 31mm</p>			
3.8.18 Power Pack + 12V DC	Decimator	PWR-12V_ML	6
Power Pack + 12V DC (Metal Lock - for MD-HX, MD-CROSS, DMON-QUAD, DMON-4S,6S,12S,16S,16SL)			
3.8.19 Distribution Amplifier	sonifex	RB-DA6G	2
Specification			
Maximum input level:+28dBu or more			
Maximum output level:+28dBu or more			
Frequency response: 20Hz to 20kHz ±0.1dB (600Ω load, ref 1kHz)			
Gain range: Adjustable 8dB loss to 18dB gain (12 adjustable pots)			
Common mode rejection: 66dB typical			
Input impedance: 20kΩ bridging or more			
Output impedance: 50Ω or less			
Distortion: 0.01% THD @ 1kHz, ref +8dBu output			
Noise: -88dB unity gain, ref +8dBu output			
Connections: including followings			
Inputs: 2 x XLR 3 pin female (balanced, can be unbalanced)			
Outputs: 12 x XLR 3 pin male (balanced, can be unbalanced)			
Dimensions:			
Depth: 108mm or less			
Width: 480mm or less			
Height: 42mm or less			
Weight: 1.9kg or less			
Power supply: 220-240Vac 50/60Hz			
Power consumption: 6W or less			
Accessories: Manufacturer standard accessories			
3.8.20 Impedance Transformer	Neutrik	NADITBNC-F	8
Specification			
AES/EBU Impedance Transformers XLR3F/BNC			
Maximum voltage / Max. power: 5Vp-p / 250mW or more			
Frequency band: 0.1MHz to 6MHz or wider			
Insertion loss: 0.3dB or less at 0.1MHz to 10MHz			
VSWR / Return loss: 1.1 or less / 26.4dB or more			
Input: 3 pole XLR female chassis			
Output: female BNC chassis			
3.8.21 Impedance Transformer	Neutrik	NADITBNC-M	16
Specification			
AES/EBU Impedance Transformers XLR3F/BNC			
Maximum voltage / Max. power: 5Vp-p / 250mW or more			
Frequency band: 0.1MHz to 6MHz or wider			
Insertion loss: 0.3dB or less at 0.1MHz to 10MHz			
VSWR / Return loss: 1.1 or less / 26.4dB or more			
Input: 3 pole XLR male chassis			
Output: female BNC chassis			
3.8.22 Cross Converter	Decimator Design	MD-DUCC	1
Specification			
Multi-Definition Down Up Cross Converter			
(3G/HD/SD)-SDI to (3G/HD/SD)-SDI, HDMI and Analogue Video			
Video Format: including followings			
3G: SMPTE 424M at 2.97 and 2.967Gb/s			
1080p@60/59.94/50Hz			
HD:SMPTE 292M/274M/296M at.485 and 1.435Gb/s			
1080 at 60/59.94/50Hz			
1080p/psf@30/29.97/25/24/23.98Hz			
720p@60/59.94/50/30/29.97/25/24/23.98Hz			
SD:SMPTE 259M at 270Mb/s			
625i50			
525i59.94			
Input: including followings			
(3G/HD/SD)-SDI 10-bit			
Conditional Maximum Equalization cable length of 400M for			
SDI, 200M for HD-SDI and 100M 3G-SDI using Belden 1694A			
Output: including followings			
HDMI			
1 x (3G/HD/SD)-SDI Active Loop-Through			

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2 x (3G/HD/SD)-SDI 10-bit Outputs			
(3 x CVBS) / (Y, Pb, Pr) / (G, B, R) / (CVBS, Y & C)			
AES 1 / Unbalanced Analogue Audio - Left			
AES 2 / Unbalanced Analogue Audio - Right			
Control: including followings			
HDMI format type			
Analogue Video format type			
Output format			
Aspect conversion type for HD to HD, HD to SD, SD to HD and SD to SD conversions.			
On-Screen Overlays Enables			
Basic Audio Meter control			
Basic Graticule Enables			
Power			
+5V to +24V DC, 5Watts			
Positive Centre Pin			
Dimensions			
90mm x 123mm x 23mm			
3.9 SYNC PULSE GENERATOR			
3.9.1 Sync Pulse Generator	COURTYARD	CY460D-PKG/02	2
Specification			
Type: Sync, test pattern and time reference generator			
Features: including followings			
PAL/NTSC/625/525 switchable			
Comprehensive range of test patterns for all analogue and digital applications			
±4 field (PAL) / ±2 field (NTSC) timing range			
Multiple & configurable reference outputs (PAL/NTSC/Tri-Level Sync in all HD formats)			
4 LTC (standard and offset) or pulse outputs (User programmable)			
VITC on all SD outputs (User Select)			
Analogue stereo tone output with programmable interrupt			
Embedded audio			
Lock time to VITC on genlock ref. input			
User programmable & animated text idents (3) (independent on each test out)			
Text idents in any language (bitmap import)			
Multiple user configurable and independently adjustable reference outputs (NTSC color black, PAL Color Black & Tri-level Sync)			
10Mhz reference input			
Genlock to Color Black or Tri-Level Sync			
2 pairs independent SD (Std.), HD & 3G SDI color black and test patterns (with embedded tone/silence)			
AES digital tone, Silence, Word clock			
Remote control, NTP Server & Client over Ethernet			
Video inputs (BNC): including followings			
75Ω looping reference			
10MHz terminating reference			
Video outputs (BNC): including followings			
Analogue color black (2) Std.			
Analogue composite test (2) Std.			
Color black/tri-level (3 independent pairs)			
SDI (SD (Std.)/HD or 3G) color black with embedded silence (2 independent pairs)			
SDI (SD (Std.)/HD or 3G) test pattern with embedded tone (2 independent pairs)			
Balanced audio/AES/LTC outputs			
Unbalanced AES audio: including followings			
AES (2)			
DARS (1)			
Word clock (TTL) 2 BNC			
Controls and Indicators: including followings			
LCD Display, Rotary Knob & Switch			
Ethernet: 100Base T, RJ45			
GPS antenna input: SMB Jack			
Timecode outputs: including followings			
LTC 4 (user select)			
VITC (user select)			
Color black outputs: including followings			
Fsc stability: ±1Hz over temperature range			
SCH phase: 0 degrees ±5 degrees			
Return loss (to 5MHz): 35dB or more			
Sync pulse generator: including followings			
Subcarrier output			
Frequency: 4.43361875MHz after warm up (PAL)			
Stability: ±1Hz over temperature range*			
Amplitude: 1Vp-p			
Return loss (to 5MHz): 35dB or more			
Pulse and pattern outputs: including following			
Signals: meet or exceed relevant EBU, CCIR and SMPTE specifications			
Genlock: including followings			
H range: ±4 fields (PAL), moves all timing relative to the reference input			
Subcarrier: 0 to 360 degrees			
Resolution: 0.5 degrees of subcarrier or less			
Operating temperature range is 0 to +40°C			
Dimensions:			
Width: 445mm or less			

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Depth: 405mm or less			
Height: 45mm or less			
Weight: 6kg or less			
Power supply: AC100 - 240V, 50/60Hz			
Power consumption: 21W or less			
Accessories: Manufacturer standard accessories			
3.9.2 HD SDI Output Option	COURTYARD	CY460/03	2
Specification			
HD SDI pattern & black output with embedders for 3.7.1 Sync Pulse Generator			
3.9.3 GPS Receiver/Antenna Option	COURTYARD	CY460/06	2
Specification			
GPS receiver including antenna, 8m cable and connector kit for 3.7.1 Sync Pulse Generator			
3.9.4 PTP Option	COURTYARD	CY460/GbEPTP	2
Specification			
PTP (Master or Slave) additional function for 3.7.1 Sync Pulse Generator			
3.9.5 NTP Option	COURTYARD	CY460/05	2
Specification			
NTP Client/Server additional function for 3.7.1 Sync Pulse Generator			
3.9.6 SPG Changeover Unit	COURTYARD	CY465A/1U6	1
Specification			
Type: 1U 6 channel SPG changeover unit with redundant "Hot Swap" PSU			
Features: including followings			
6 channels in 1U			
Front panel visual fault indication			
Manual override facility			
All channels can measure analogue color black, SD & HD SDI, 3G SDI, HD Tri-level sync, Timecode, & AES/EBU Audio			
Includes CD & floppy for archive purposes			
Dual redundant hot swappable PSU's			
All channels user configurable			
Clear fault indication on front panel LCD			
All channels will switch if one channel fails			
Conforms to relevant EBU, ITU-R or SMPTE specifications.			
Input (per channel)			
Primary (terminating BNC)			
Backup (terminating BNC)			
Output ((per channel)			
BNC (single)			
Controls and Indicators			
LCD Display, Rotary Knob & Switch			
Changeover threshold			
Analogue color black			
On loss of signal			
Serial Digital Video: On loss of signal			
AEE/EBU audio: On loss of signal			
HD Tri-level sync: On loss of signal			
Timecode: On loss of signal			
Return Loss: 36dB or more at 4.43MHz			
Isolation: 60dB or more, both directions on all channels to 1.5GHz			
Dimensions:			
Depth: 380mm or less			
Width: 483mm or less			
Height: 44mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 40W or less			
Weight: 6kg or less			
Accessories: Manufacturer standard accessories			
3.10 VIDEO MONITORING			
3.10.1 Video Monitoring for Production Area			
3.10.1.1 Monitor	IYYAMA	LH4342UHS-B3	4
Specification			
Display			
Display panel: IPS			
Diagonal: 42.5"			
Native resolution: 3840 x 2160 or superior			
Aspect ratio 16:9			
Panel brightness: 500cd/m ² or brighter			
Static contrast 1300:1 or better			
Advanced contrast 80M:1 or better			
Response time: 9ms or better			
Color support: 1.07G			
Horizontal Sync: 30 - 80kHz			
Pixel pitch 0.245mm			
Signal input: including followings			
DVI x1			
HDMI x 3			
DisplayPort x 1			

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Mechanical			
VESA mounting: 200 x 200mm			
Operating temperature range: 0°C to 40°C or wider			
Weight: 10.7kg or less			
Power supply: AC100 - 240V, 50/60Hz			
Power consumption: 116W typical			
Accessories: Manufacturer standard accessories			
3.10.1.2 Cross Converter	Decimator Design	MD-LX	4
Specification			
SDI Format: including followings			
3G-A or 3G-B:SMPTE 424M@2.97 and 2.967Gb/s			
1080p@60/59.94/50Hz			
HD:SMPTE 292M/274M/296M@1.485 and 1.435Gb/s			
1080i@60/59.94/50Hz			
1080p/psf@30/29.97/25/24/23.98Hz			
720p@60/59.94/50/30/29.97/25/24/23.98Hz			
SD:SMPTE 259M@270Mb/s			
625i50 (PAL)			
525i59.94 (NTSC)			
HDMI Format: including followings			
1080p@60/59.94/50/30/29.97/25/24/23.98Hz			
1080i@60/59.94/50Hz			
720p@60/59.94/50/30/29.97/25			
625i50 (PAL)			
525i59.94 (NTSC)			
Input: including followings			
1 x HDMI Type A			
1 x (3G/HD/SD)-SDI			
Micro USB for power, control and firmware updates			
Output: including followings			
1 x HDMI Type A			
1 x (3G/HD/SD)-SDI			
Dimensions:			
Length: 74mm or less			
Width: 60mm or less			
Height: 23mm or less			
Power supply: USB Power +4.4V to +5.25V DC			
Power consumption: 2.5W or less			
Accessories: Manufacturer standard accessories			
3.10.1.3 Monitor	IYYAMA	T2435MSC-B2	2
Specification			
Display			
Display panel: VA LED			
Diagonal: 23.6"			
Native resolution: 1920 x 1080 or superior			
Aspect ratio 16:9			
Panel brightness: 215cd/m ² or brighter			
Static contrast 3000:1 or better			
Advanced contrast 12M:1 or better			
Response time: 4ms or better			
Color support: 16.7mln			
Horizontal Sync: 30 - 80kHz			
Pixel pitch 0.272mm			
Touch			
Touch technology: projective capacitive			
Touch points: 10 (HID, only with supported OS)			
Touch method: stylus, finger, glove (latex)			
Touch interface: USB			
Supported operating systems: Windows, Linux			
Signal input: including followings			
DVI x1			
HDMI x1			
DisplayPort x1			
Mechanical			
VESA mounting: 100 x 100mm			
Operating temperature range: 5°C to 35°C or wider			
Weight: 6.3kg or less			
Power supply: AC100 - 240V, 50/60Hz			
Power consumption: 25W typical			
Accessories: Manufacturer standard accessories			
3.10.1.4 Monitor	IYYAMA	XUB2292HS-B1	4
Specification			
Display			
Display panel: IPS			
Diagonal: 21.5"			
Native resolution: 1920 x 1080 or superior			
Aspect ratio 16:9			
Panel brightness: 250cd/m ² or brighter			
Static contrast 1000:1 or better			
Advanced contrast 80M:1 or better			

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Response time: 4ms or better			
Color support: 16.7mln			
Horizontal Sync: 30 - 85kHz			
Pixel pitch 0.248mm			
Signal input: including followings			
VGA x1			
HDMI x1			
DisplayPort x1			
Mechanical			
VESA mounting: 100 x 100mm			
Operating temperature range: 5°C to 35°C or wider			
Weight: 4.8kg or less			
Power supply: AC100 - 240V, 50/60Hz			
Power consumption: 18W typical			
Accessories: Manufacturer standard accessories			
3.10.1.5 Swivel Arm / Monitor Mount	Broadcast Solutions	custom build	4
Specification			
Type: Swivel arm / monitor mount			
Mount type and swivel mechanism: to be proposed			
3.10.1.6 Tuner (Customer Supplied)			(1)
Specification			
Tuner			
3.10.1.7 Antenna	Broadcast Solutions	custom build	1
Specification			
Type; DVB-T2 antenna with cable for external installation			
Antenna form and mounting bracket: to be proposed			
Antenna gain and booster: to be proposed			
3.10.1.8 Cross Converter	Decimator Design	MD-LX	1
Specification			
SDI Format: including followings			
3G-A or 3G-B:SMPTE 424M@2.97 and 2.967Gb/s			
1080p@60/59.94/50Hz			
HD:SMPTE 292M/274M/296M@1.485 and 1.435Gb/s			
1080i@60/59.94/50Hz			
1080p/psf@30/29.97/25/24/23.98Hz			
720p@60/59.94/50/30/29.97/25/24/23.98Hz			
SD:SMPTE 259M@270Mb/s			
625i50 (PAL)			
525i59.94 (NTSC)			
HDMI Format: including followings			
1080p@60/59.94/50/30/29.97/25/24/23.98Hz			
1080i@60/59.94/50Hz			
720p@60/59.94/50/30/29.97/25			
625i50 (PAL)			
525i59.94 (NTSC)			
Input: including followings			
1 x HDMI Type A			
1 x (3G/HD/SD)-SDI			
Micro USB for power, control and firmware updates			
Output: including followings			
1 x HDMI Type A			
1 x (3G/HD/SD)-SDI			
Dimensions:			
Length: 74mm or less			
Width: 60mm or less			
Height: 23mm or less			
Power supply: USB Power +4.4V to +5.25V DC			
Power consumption: 2.5W or less			
Accessories: Manufacturer standard accessories			
3.10.2 Video Monitoring Engineer Area			
3.10.2.1 Monitor	AG Neovo	HX-24G	2
Specification			
Panel: including followings			
24" 1920x1080 Monitor 3G SDI in/out, CVBS in/out, HDMI, DVI, VGA, Audio in			
SDI connection supports 3Gb/s, 1.5 Gb/s HD, SD SDI video inputs			
Panel Type LED-Backlit TFT LCD (VA Technology)			
Panel Size 23.8"			
Max. Resolution FHD 1920 x 1080			
Pixel Pitch 0.274mm			
Brightness 250cd/m ²			
Contrast Ratio 20,000,000:1 (DCR)			
Viewing Angle (H/V) 178°/178°			
Display Color 16.7M			
Response Time 5ms			
Frequency: including followings			
Frequency (H) 24kHz-83kHz			
Frequency (V) 50Hz-75Hz			
Signal Input: including followings			

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SDI BNC x 1			
DisplayPort x 1			
HDMI 1.4 x 1			
DVI 24-Pin DVI-D			
VGA 15-Pin D-Sub x 1			
Composite BNC x 1			
Signal Output: including followings			
SDI BNC x 1			
Composite BNC x 1			
External Control RS232 In 2.5mm Phone Jack			
Other Connectivity USB 2.0 x 1 (Service Port)			
Audio: including followings			
Audio In Stereo Audio Jack (3.5mm), Stereo Audio Jack (RCA)			
Internal Speakers 2W x 2			
Operating temperature range: 0 to 40°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Depth: 198mm or less			
Width: 565mm or less			
Height: 395mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 18W or less			
Weight: 8.5kg or less			
Accessories: Manufacturer standard accessories			
3.10.2.2 Broadcast Monitor	KONVISION	KVM-2461W	2
Specification			
Features: including followings			
High Dynamic Range(HDR)			
EOTF Curve Conversions			
Part Zoom In			
Darkness Check			
PIP & PBP			
Picture Flip			
Pixel Measurement			
3D LUT Color Calibration			
3D LUT files import			
Waveform(Alarm), Vectors			
False Color			
Focus Assist			
Zebra			
Display			
Display panel: LCD			
Diagonal: 24"			
Native resolution: 1920 x 1080 or superior			
Aspect ratio 16:9			
Panel brightness: 250cd/m ² or brighter			
Static contrast 1000:1 or better			
input: including followings			
BNC x 2 (SDI 1/2 signal input)			
BNC x 3 (YPbPr/Video/Y/C inputs)			
DVI-I x1			
HDMI x 1			
Output: including followings			
BNC x 2 (SDI 1/2 signal input)			
BNC x 3 (YPbPr/Video/Y/C inputs)			
Tally: LED tally light and on-screen tally display			
VESA mounting: 100 x 100mm			
Power supply: DC12V and AC100 - 240V, 50/60Hz			
Power consumption: 37W or less			
Accessories: Manufacturer standard accessories			
3.10.2.3 HDR Monitor	KONVISION	KUM-2410W	1
24" 4K HDR Monitor with 12G-SDI			
Panel			
Display Size: 24"			
Resolution: 3840x2160			
Aspect Ratio: 16 : 9			
Viewing Angle: 178°(H) / 178°(V)			
Pixel Pitch: 0.13725x0.13725(mm)			
Color Depth: 1.07B			
Back Light: LED			
Brightness: 540cd/m ²			
Contrast Ratio: 2000:1			

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<p>INPUT 2x BNC: 12G-SDI 1/2signal inputs(Auto-detected and compatible to 6G/3G/HD/SD-SDI) 2x BNC: 3G-SDI 3/4 signal inputs(3G/HD/SD-SDI auto detected) 1 x SDI SFP+: SDI SFP+ input cage 1 x HDMI 2.0 (optional): HDMI 2.0 Signal 2x BNC: 12G-SDI 1/2signal outputs(Auto-detected and compatible to 6G/3G/HD/SD-SDI) 2x BNC: 3G-SDI 3/4 signal outputs(3G/HD/SD-SDI auto detected) GENERAL Operating Temperature: -10°~ 50° Input Voltage: DC 12V & AC 100-240V 50/60Hz Power Consumption: 70 W Power-Saving Mode: Turn off unimportant key Automatically if no signal input VESA Installation: VESA MIS-D(100X100mm) Accessory: Power Cord /Desktop stand</p>			
<p>3.10.2.4 Waveform Monitor</p>	LEADER	LV5300A	1
<p>Screen Size (Diagonal): 7" / 178 mm Display: TFT Color Liquid Crystal Resolution: 1920 x 1080 at 60, 59.94, and 50 Hz Touch Panel Type: Electrostatic Capacity Resolution: Up to 2048 x 1020 at 60 fps Bit Depth: 10- and 12-Bit Signal Support: SD, HD, 3G, and 12G-SDI Single-Link Formats Color Space: BT.709, BT.2020, or DCI P3 Controls: Touchscreen, Mouse, and Front-Panel Buttons Input Signals: TLS or NTSC/PAL, Black Burst Signal, and Field ID Correspondence Function: SDI Reference Signal Input for Video Signal Waveform Display and Phase Difference Display, Eye pattern display Connectors: 2 x BNC, SDI Video Input 2 x BNC, SDI Video Output 1 x BNC, Video Reference Input 1 x BNC, Video Reference Loop-Through 2 x USB 2.0 Type-A, Control Port (Front) 1 x 4-Pin XLR, DC Power Input 1 x 15-Pin Sub-D Female, Remote Port 1 x RJ45, Ethernet Port 1 x 1/8" / 3.5 mm Jack, Headphones Output (Front) USB CompatibilityMemory, Mouse, and Touch-Panel Type Monitor Output Signals SupportedHD, 3G-A, 3G-B-DL, and Single-Link T.M.D.S StandardIEEE802.3 Protocol SupportTELNET, FTP, SNMP, HTTP, and SNTP Ethernet Support10Base-T, 100Base-TX, and 1000Base-T Embedded AudioSMPTE ST 299, SMPTE ST 272, 48 kHz, 24-Bit, and L-PCM StandardITU-R BT.2100 (HLG, PQ), and S-Log 3 Supported FormatAll except for SD and XYZ Input of SDI. Pattern Type100% Color Bar, 75% Color Bar, HD Multi-Format Color Bar, Color Raster, Cross Hatch, 10 Steps, Limit Lamp, Check Field, and Lip Sync pattern. Speed Range4 to 124 Dots per Frame ColorWhite, Yellow, Cyan, Green, Magenta, Red, Blue, and Black Noise Level20 dBFS, -18 dBFS, 0 dBFS, and Mute *Frame Rate for Horizontal 4096/2048 Pixel Format at Frame Input Impedance15 Kilohms Passive Loop Through Input Return Loss : more than 30 dB Maximum Input Voltage± 5 VDC + Peak AC Control SignalLV- TTL Level</p>			
<p>3.10.2.5 AC ADAPTER</p>	LEADER	GST90A12	1
<p>AC ADAPTER for LV5300, LV5350 and LV7300</p>			
<p>3.10.2.6 Dual RACKMOUNT Adapter</p>	LEADER	LR2530	1
<p>Dual RACKMOUNT Adapter for LV5350</p>			
<p>3.10.2.7 BLANK PANEL</p>	LEADER	LC2535	1
<p>BLANK PANEL for LR2530</p>			
<p>3.10.2.8 Monitor</p>	IIYAMA	XUB2292HS-B1	1
<p>Monitor 21.5", IPS Panel Technology, Native resolution 1920 x 1080 @75Hz, Aspect ratio 16:9, Panel brightness 250 cd/m², Static contrast 1000:1, Advanced contrast80M:1, Response time (GTG) 4ms, Horizontal Sync 30 - 85kHz, Viewable area W x H 476 x 267.8mm, 18.7 x 10.5", Pixel pitch 0.248mm, Signal input: VGA x1 (1920 x 1080 @60Hz), HDMI x1 (1920 x 1080 @75Hz), DisplayPort x1 (1920 x 1080 @75Hz), Signal output: Headphone connector</p>			
<p>3.10.3 Video Monitoring Sound Area</p>			
<p>3.10.3.1 Monitor</p>	IIYAMA	XUB2793HS-B5	2
<p>Specification</p>			
<p>Display</p>			
<p>Display panel: IPS</p>			
<p>Diagonal: 27"</p>			
<p>Native resolution: 1920 x 1080 or superior</p>			
<p>Aspect ratio 16:9</p>			
<p>Panel brightness: 300cd/m² or brighter</p>			
<p>Static contrast 1000:1 or better</p>			
<p>Advanced contrast 80M:1 or better</p>			

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Response time: 4ms or better			
Color support: 16.7mln			
Horizontal Sync: 30 - 83kHz			
Pixel pitch 0.311mm			
Signal input: including followings			
HDMI x1			
DisplayPort x1			
Mechanical			
VESA mounting: 100 x 100mm			
Operating temperature range: 5°C to 35°C or wider			
Weight: 6.8kg or less			
Power supply: AC100 - 240V, 50/60Hz			
Power consumption: 19W typical			
Accessories: Manufacturer standard accessories			
3.10.3.2 Cross Converter	Decimator Design	MD-LX	2
Specification			
SDI Format: including followings			
3G-A or 3G-B:SMPTE 424M@2.97 and 2.967Gb/s			
1080p@60/59.94/50Hz			
HD:SMPTE 292M/274M/296M@1.485 and 1.435Gb/s			
1080i@60/59.94/50Hz			
1080p/psf@30/29.97/25/24/23.98Hz			
720p@60/59.94/50/30/29.97/25/24/23.98Hz			
SD:SMPTE 259M@270Mb/s			
625i50 (PAL)			
525i59.94 (NTSC)			
HDMI Format: including followings			
1080p@60/59.94/50/30/29.97/25/24/23.98Hz			
1080i@60/59.94/50Hz			
720p@60/59.94/50/30/29.97/25			
625i50 (PAL)			
525i59.94 (NTSC)			
Input: including followings			
1 x HDMI Type A			
1 x (3G/HD/SD)-SDI			
Micro USB for power, control and firmware updates			
Output: including followings			
1 x HDMI Type A			
1 x (3G/HD/SD)-SDI			
Dimensions:			
Length: 74mm or less			
Width: 60mm or less			
Height: 23mm or less			
Power supply: USB Power +4.4V to +5.25V DC			
Power consumption: 2.5W or less			
Accessories: Manufacturer standard accessories			
3.10.3.3 Mount Kit	Broadcast Solutions	custom build	2
Specification			
Use: Mounting kit for 3.10.3.1 Monitor			
3.10.4 Video Monitoring			
3.10.4.1 LCD Screen	Black Magic Design	BM-HDL-SMTWSCOPEDU04K2	1
Specification			
Type: Two independent 8 inch LCD screens in a compact rack mount design			
Multi Rate Support: Standard definition SDI, high definition SDI and 6G-SDI.			
SDI Video Input: Automatically switches between SD, HD and 6G-SDI. Reclocked loop through output.			
SDI Video Output: 1 x 10 bit loop through SD, HD and 6G-SDI switchable.			
SDI Audio Input: 16 channels embedded in SD, HD and UHD.			
SDI Audio Output: 16 channels embedded in SD, HD and UHD.			
Tally: 9-pin D connector			
Standards			
SD Format Support: 525i29.97 NTSC, 625i25 PAL			
HD Format Support: 720p50, 59.94, 60 / 1080p23.98, 24, 25, 29.97, 30, 50, 59.94, 60 / 1080PsF23.98, 24, 25, 29.97, 30 / 1080i50, 59.94, 60			
2K Format Support: 2K DCI 23.98p, 2K DCI 24p, 2K DCI 25p / 2K DCI 23.98PsF, 2K DCI 24PsF, 2K DCI 25PsF			
Ultra HD Format Support: 2160p23.98, 24, 25, 29.97, 30			
SDI Compliance: including followings			
SMPTE 259M, SMPTE 292M, SMPTE 296M, SMPTE 372M, SMPTE 424M Level B and SMPTE 425M			
Audio Sampling: Television sample rate of 48KHz			
Video Sampling: 4:2:2 and 4:4:4			
Color Precision: 8-bit			
Color Space: YUV and RGB			
Scopes: Luminance Waveform, Vectorscope, RGB Parade, YUV Parade, Histogram, Audio phase and level			
Operating temperature range: 0 to 40°C or wider			
Operating humidity range (non condensing): 0% to 90% or wider			
Dimensions:			
Depth: 35mm or less			

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Width: 482mm or less			
Height: 135mm or less			
Weight: 1.6kg or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 20W or less			
Accessories: Manufacturer standard accessories			
3.10.5 External Monitors			
3.10.5.1 Monitor	AG Neovo	HX-24G	2
Specification			
Panel: including followings			
24" 1920x1080 Monitor 3G SDI in/out, CVBS in/out, HDMI, DVI, VGA, Audio in			
SDI connection supports 3Gb/s, 1.5 Gb/s HD, SD SDI video inputs			
Panel Type LED-Backlit TFT LCD (VA Technology)			
Panel Size 23.8"			
Max. Resolution FHD 1920 x 1080			
Pixel Pitch 0.274mm			
Brightness 250cd/m ²			
Contrast Ratio 20,000,000:1 (DCR)			
Viewing Angle (H/V) 178°/178°			
Display Color 16.7M			
Response Time 5ms			
Frequency: including followings			
Frequency (H) 24kHz-83kHz			
Frequency (V) 50Hz-75Hz			
Signal Input: including followings			
SDI BNC x 1			
DisplayPort x 1			
HDMI 1.4 x 1			
DVI 24-Pin DVI-D			
VGA 15-Pin D-Sub x 1			
Composite BNC x 1			
Signal Output: including followings			
SDI BNC x 1			
Composite BNC x 1			
External Control RS232 In 2.5mm Phone Jack			
Other Connectivity USB 2.0 x 1 (Service Port)			
Audio: including followings			
Audio In Stereo Audio Jack (3.5mm), Stereo Audio Jack (RCA)			
Internal Speakers 2W x 2			
Operating temperature range: 0 to 40°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Depth: 198mm or less			
Width: 565mm or less			
Height: 395mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 18W or less			
Weight: 8.5kg or less			
Accessories: Manufacturer standard accessories			
3.10.5.2 Flight Case			
Specification	Broadcast Solutions	custom build	2
Use: for transportation of external monitor equipment			
Durability: shall be strong enough in harsh environment			
Size/shape/composition: to be proposed			
3.10.5.3 Coaxial Cable with Drum			
Specification	Broadcast Solutions	custom	4
Cable: H07RN-F 3x 1.5mm ² or equivalent			
Cable length: 100m			
Jacket color: to be proposed			
Ingress Protection (Plug & Socket): IP44			
Drum type: CDR 310 or similar			
4. AUDIO			
4.1 AUDIO MIXER			
4.1.1 Main Console			
4.1.1.1 Mixer	CALREC	Brio 36 SET	1
Specification			
36 Fader Broadcast Digital Audio Mixer Set, composed by the followings			
4.1.1.1.1 Console			
Specification	CALREC	SL6484	1
Type: 36 Fader Compact Broadcast Console			
Surface: including followings			
36 x dual layer faders 100mm, motorized, with PFL overpress			
15.6" HD touchscreen UI			
1 x user assignable rotary control per strip			
2 x user assignable buttons per strip			
DSP: including followings			
Freely configurable on the fly, operates at 44.1, 48, 88.2 and 96kHz:			
Up to 96 legs assignable as mono, stereo, or 5.1 Input Channels			
36 legs assignable as mono, stereo or 5.1 mains or groups			

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24 legs assignable as mono or stereo auxes			
Up to 96 legs assignable as Insert sends and returns			
Up to 96 legs assignable as Direct, or Mix-Minus Outputs			
Automatic Mix-Minus			
Off-Air Conference for Mix-Minus			
Dynamics: including followings			
Every Input Channel and Group path:			
Expander/Gate/Ducker, with key input and sidechain EQ			
Compressor with key input and sidechain EQ			
Multiband Compressor			
Every Aux:			
Expander/Gate			
Compressor			
Every Main:			
Single Band Compressor			
Multiband Compressor			
EQ: including followings			
6 band EQ available on every Input Channel, Group, Aux and Main path:			
4 band full PEQ			
2 band LF/HF filters, 12 or 24dB/octave			
Delay: including followings			
Delay available on every path			
Up to 64 legs assignable as output delay			
Up to 64 legs assignable as input delay			
Monitoring/Metering: including followings			
3 x Monitor outputs			
Surround capable metering within each strip			
Configurable meter screen output (DVI)			
Loudness meters			
Multiple Sample Rates: including followings			
Functions at 48, 96, 44.1 or 88.2kHz			
All DSP facilities are available at all sample rates			
Remote/Automated Control: including followings			
Remote/Automated Control			
8 x GPI + 8 x GPO built in**			
Auto Faders for Audio Follows Video style control			
CSCP mixer control protocol interfaces with a variety of video switchers and production automation systems			
I/O: including followings			
24 x Mic/Line inputs			
16 x Analogue outputs			
8 x AES3 digital inputs			
8 x AES3 digital outputs			
3 x Expansion slots to increase standard built in I/O, or to provide interface to other formats, including SDI, MADI, Dante etc.			
Operating temperature range: 0 to 40°C or wider			
Operating humidity range (non condensing): 5% to 80% or wider			
Dimensions:			
Depth: 895mm or less			
Width: 895mm or less			
Height: 275mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 300W or less			
Weight: 30kg or less			
Accessories: Manufacturer standard accessories			
4.1.1.1.2 Module	CALREC		1
Specification			
Optional Internal Router module			
4.1.1.1.3 Module	CALREC	BI6192	1
Specification			
Dante 64 channel ethernet bridge module			
Format: Digital			
Type: Dante			
Connector: 2x RJ45 or more			
Inputs: 64 (at 48kHz or 44.1kHz), 32 (at 96kHz) or more			
Outputs: 64 (at 48kHz or 44.1kHz), 32 (at 96kHz) or more			
4.1.1.1.4 Module	CALREC	JM6199	2
Specification			
MADI 64 channel I/O module			
Format: Digital			
Type: DI (AES 10)			
Input: 1 x 64/56 channel input stream (at 48KHz) or more			
Output: 1 x 64 channel output stream (at 48KHz) or more			
Audio Connector: including BNC+SFP			
4.1.1.1.5 SFP Module	CALREC	491-254	2
Specification			
MADI SX-LC fibre SFP			
4.1.1.1.6 Module	CALREC	RY6211-2	1

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Specification			
Optional Network Module allows for further I/O to be connected, and to network audio with other consoles with redundant PSU			
I/O Connector:			
RTR Pri/Sec: 2x SFP			
EXT Pri/Sec: 8x SFP			
Dimensions:			
Depth: 290mm or less			
Width: 220mm or less			
Height: 44mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Weight: 2kg or less			
Accessories: Manufacturer standard accessories			
4.1.1.1.7 SFP Module	CALREC	491-114	4
Specification			
1 Gbit Copper SFP			
4.1.1.1.8 SFP Module	CALREC	491-195	2
Specification			
Bi-Directional B type SM fibre (10km) SFP			
4.1.1.1.9 SFP Module	CALREC	491-196	2
Specification			
Bi-Directional A type SM fibre (10km) SFP			
4.1.1.2 Monitor	IYYAMA	XUB2292HS-B1	1
Specification			
Display			
Display panel: IPS			
Diagonal: 21.5"			
Native resolution: 1920 x 1080 or superior			
Aspect ratio 16:9			
Panel brightness: 250cd/m ² or brighter			
Static contrast 1000:1 or better			
Advanced contrast 80M:1 or better			
Response time: 4ms or better			
Color support: 16.7mln			
Horizontal Sync: 30 - 85kHz			
Pixel pitch 0.248mm			
Signal input: including followings			
VGA x1			
HDMI x1			
DisplayPort x1			
Mechanical			
VESA mounting: 100 x 100mm			
Operating temperature range: 5°C to 35°C or wider			
Weight: 4.8kg or less			
Power supply: AC100 - 240V, 50/60Hz			
Power consumption: 18W typical			
Accessories: Manufacturer standard accessories			
4.1.1.3 Monitor Mount	Broadcast Solutions	custom build	1
Specification			
Swivel arm / monitor mount			
Reposition the monitor quickly with no knobs to turn			
Internal cable management			
Mounting kit allows different mounting options			
Supports up to 4kg			
4.1.1.4 Managed Switch	CISCO	CBS350-24T-4X-EU	2
Specification			
Type: Layer 3 Switch			
Interface: including 24x Gigabit Ethernet ports , 4x 10G SFP ports, 1x console port			
Throughput: 95mpps or more			
Switching capacity: 125Gbps or more			
Packet buffer: 1.5MB or more			
IPV4/IPV6 routing: supported			
Hardware stacking: Up to 200 ports managed as a single system with hardware failover or superior			
Port grouping/link aggregation: Support for IEEE 802.3ad Link Aggregation Control Protocol (LACP) up to 8 groups or superior			
Power over Ethernet: 24 PoE ports with 190W total power budget, PoE, PoE+, or superior			
VLAN: Support for up 4,000 VLANs simultaneously or more			
Spanning Tree Protocol: Comply IEEE 802.1d			
RADIUS/TACACS+: Supports RADIUS and TACACS authentication			
Security: DOS attack prevention			
Fan: 1x fixed fan			
Operating temperature range: -5 to 50°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Depth: 300mm or less			
Width: 445mm or less			
Height: 44mm or less			

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Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Weight: 3kg or less			
Accessories: Manufacturer standard accessories			
4.1.1.5 Headphone	Beyerdynamic	DT 770 PRO	1
Specification			
Transducer type: Dynamic			
Operating principle: Closed			
Nominal frequency response: 5 - 35,000Hz or wider			
Nominal impedance : 32Ω / 80Ω / 250Ω			
Nominal SP: 96dB or more			
Nominal T.H.D : 0.2% or less			
Power handling capacity: 100mW or similar			
Sound coupling to ear: Circumaural			
4.1.1.6 Loudness	RTW	TM3S	1
Specification			
Features: including followings			
4.3" capacitive touch screen for vertical or horizontal use (82.5 x 138 x 21/50mm, WxHxD)			
Flexible display layout with scalable instruments			
Separate interface box with audio I/O, USB, GPIO, low voltage connector (146 x 27 x 85mm, WxHxD)			
Audio: analog balanced (D-Sub) or unbalanced (RCA), S/PDIF (RCA), 3 x AES3 (D-Sub)			
2-channel Stereo (analog, digital), multichannel (digital), 5.1 (digital), input sources alternatively selectable, max. 6 channels at a time			
USB 2.0 connector (Mini-B), GPIO connector (RJ-12)			
Moving Coil instruments			
Loudness: EBU R128, ITU-R BS.1770-4/1771-1, ATSC A/85, ARIB, OP-59, AGCOM, CALM Act, customer specific			
Single channel and summing loudness bar graphs			
Loudness Test Time Control			
Loudness range (LRA) with MagicLRA			
Loudness chart			
Timecode Reader			
PPM & True Peak			
SPL & Dialnorm			
4.1.1.7 Adapter Cable	RTW	1162	1
Specification			
Adapter cable, 2 m, for PPM Metering			
Interface boxes, from 25p Sub-D connector to 2 x XLR-F cable coupling for "Analog In", 3 x XLR-F			
Cable connector for "AES3 In", 3 x XLR-M-			
Cable connector for "AES3 Out			
4.1.2 Internal Stage Box			
4.1.2.1 Interface Box	Calrec	AD6300	1
Specification			
Including followings			
I/O Rackmount Audio Interfaces Box			
24 x Analogue Mic/Line I/Ps,			
16 x Analogue Line O/Ps,			
8 x Digital AES I/Ps, with SRC,			
4.1.3 External Stage Box			
4.1.3.1 Interface Box	Calrec	AD6300	1
Specification			
Including followings			
I/O Rackmount Audio Interfaces Box			
24 x Analogue Mic/Line I/Ps,			
16 x Analogue Line O/Ps,			
8 x Digital AES I/Ps, with SRC,			
8 x Digital AES O/Ps.			
4.1.3.2 19" Case	Broadcast Solutions	custom build	1
Specification			
19" Case, 6RU , incl. internal power distribution, connecting panels			
4.1.3.3 Switch	Broadcast Solutions	custom build	1
Specification			
Automatic power switch on/off			
4.1.3.4 Fiber Connection Panel	Broadcast Solutions	custom build	2
Specification			
Fiber Connection panel			
4.1.3.5 Cable	Broadcast Solutions	custom made	1
Specification			
Type: Both-end connectorized duplex fibre cable coiled on cable drum			
Fiber cable type: Singlemode, 2 fibers			
Length: 150 m			
Connector type: Aluminum waterproof LC connectors			
Drum type: CDR 310 or similar			

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4.2 AUDIO MONITORING			
4.2.1 Audio Monitoring Production Area			
4.2.1.1 Audio Monitor	GENELEC	8020DPM	2
Specification			
2-Way Active Studio Monitor			
Speakers: 105mm Woofer + 19mm Metal dome tweeter with DCW or similar			
Power amp output: 50W (bass) + 50W (treble) or more			
Bass reflex housing made from aluminum or similar			
Active crossover and effective protection circuits or similar			
Magnetic shielding			
Recessed connector			
Automatic on/off switch			
Power switch			
Frequency Response: 62Hz - 20kHz (± 2.5dB)			
Low cutoff: -6dB 56Hz			
High cutoff: -6dB 25kHz			
Peak SPL: 107dB or more at 1 m distance			
Self-generated noise: 5dB SPL or less at 1 m on axis			
Operating temperature range: -10 to 50°C or wider			
Operating humidity range (non condensing): 0% to 90% or wider			
Dimensions:			
Depth: 145mm or less			
Width: 150mm or less			
Height: 230mm or less			
Weight: 3.2kg or less			
Power supply: AC100-240V 50/60Hz			
Power consumption: 60W or less			
Accessories: Manufacturer standard accessories			
4.2.1.2 Mount Kit	Broadcast Solutions	Custom Build	2
Specification			
Use: Mounting kit for 4.2.1.1 Audio Monitor			
4.2.1.3 Controller	SONIFEX	RM-MC4L	1
Specification			
Type: Monitor Controller, 4 Stereo Inputs, 1 Stereo Output With Light Control			
Input Impedance: 20kΩ or less			
Maximum Input Level: +25dBu or more			
Output Impedance: 50Ω or less			
Maximum Output Level: +25dBu or more			
Attenuation Range: 86dB or more			
DIM Attenuation Range: Adjustable -3dB to -23dB or wider via rear panel potentiometer			
Common Mode Rejection: 66dB or more			
Distortion: 0.04% ref +8dBu or less			
Crosstalk: -80dB @ 1kHz input, ref 0dBu or less			
Front Panel Operation Controls: including followings			
Light Control (All units): Transmit (TX), Standby & Rehearse (REH) illuminated buttons			
Channel Select: 1, 2, 3 & 4 illuminated buttons			
Audio Controls: Dim & Cut illuminated buttons			
Volume Control: Rotary potentiometer for output attenuation on front panel			
Rear Panel Connections: including followings			
Audio Inputs: 8 x XLR 3-pin female (balanced)			
Audio Outputs: 2 x XLR 3-pin male (balanced)			
Remote I/O Port: 15 way D-type socket			
Dimensions:			
Depth: 110mm or less			
Width: 480mm or less			
Height: 43mm or less			
Weight: 1.9kg or less			
Power supply: AC100-240V 50/60Hz			
Power consumption: 10W or less			
Accessories: Manufacturer standard accessories			
4.2.2 Audio Monitoring Engineering Area			
4.2.2.1 Active Speaker	Fostex	6301NB	2
Specification			
Speaker			
Enclosure type: Closed			
Unit: 10cm full range speaker			
Frequency response: 70Hz to 15KHz or wider			
Sound Pressure Level: 85dB /W (1m)			
Maximum SPL: 98dB			
Amplifier			
Input: Unbalanced 6.3mm jack input			
Rated output: 20W or more			
Distortion (T.H.D.): 0.05% (1kHz / 1W output) or better			
Residual Noise: -70dBV or less			
Input Sensitivity: -14dBV (0.2Vr.m.s.) or better			
Input impedance: 10kΩ or more			
Operating temperature range: -10 to 50°C or wider			
Operating humidity range (non condensing): 0% to 90% or wider			
Dimensions:			

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Depth: 120mm or less			
Width: 120mm or less			
Height: 190mm or less			
Weight: 2.2kg or less			
Power supply: AC100-240V 50/60Hz			
Power consumption: 10W or less			
Accessories: Manufacturer standard accessories			
4.2.2.2 Mount Kit	Broadcast Solutions	Custom Build	2
Specification			
Use: Mounting kit for 4.2.2.1 Active Speaker			
4.2.2.3 Controller	SONIFEX	RM-MC4L	1
Specification			
Type: Monitor Controller, 4 Stereo Inputs, 1 Stereo Output With Light Control			
Input Impedance: 20kΩ or less			
Maximum Input Level: +25dBu or more			
Output Impedance: 50Ω or less			
Maximum Output Level: +25dBu or more			
Attenuation Range: 86dB or more			
DIM Attenuation Range: Adjustable -3dB to -23dB or wider via rear panel potentiometer			
Common Mode Rejection: 66dB or more			
Distortion: 0.04% ref +8dBu or less			
Crosstalk: -80dB @ 1kHz input, ref 0dBu or less			
Front Panel Operation Controls: including followings			
Light Control (All units): Transmit (TX), Standby & Rehearse (REH) illuminated buttons			
Channel Select: 1, 2, 3 & 4 illuminated buttons			
Audio Controls: Dim & Cut illuminated buttons			
Volume Control: Rotary potentiometer for output attenuation on front panel			
Rear Panel Connections: including followings			
Audio Inputs: 8 x XLR 3-pin female (balanced)			
Audio Outputs: 2 x XLR 3-pin male (balanced)			
Remote I/O Port: 15 way D-type socket			
Dimensions:			
Depth: 110mm or less			
Width: 480mm or less			
Height: 43mm or less			
Weight: 1.9kg or less			
Power supply: AC100-240V 50/60Hz			
Power consumption: 10W or less			
Accessories: Manufacturer standard accessories			
4.2.3 Audio Monitoring Sound Area			
4.2.3.1 Audio Monitor	GENELEC	8020DPM	2
Specification			
2-Way Active Studio Monitor			
Speakers: 105mm Woofer + 19mm Metal dome tweeter with DCW or similar			
Power amp output: 50W (bass) + 50W (treble) or more			
Bass reflex housing made from aluminum or similar			
Active crossover and effective protection circuits or similar			
Magnetic shielding			
Recessed connector			
Automatic on/off switch			
Power switch			
Frequency Response: 62Hz - 20kHz (± 2.5dB)			
Low cutoff: -6dB 56Hz			
High cutoff: -6dB 25kHz			
Peak SPL: 107dB or more at 1 m distance			
Self-generated noise: 5dB SPL or less at 1 m on axis			
Operating temperature range: -10 to 50°C or wider			
Operating humidity range (non condensing): 0% to 90% or wider			
Dimensions:			
Depth: 145mm or less			
Width: 150mm or less			
Height: 230mm or less			
Weight: 3.2kg or less			
Power supply: AC100-240V 50/60Hz			
Power consumption: 60W or less			
Accessories: Manufacturer standard accessories			
4.2.3.2 Mount Kit	Broadcast Solutions	Custom Build	2
Specification			
Use: Mounting kit for 4.2.3.1 Audio Monitor			
4.2.3.3 Active Speaker	Fostex	6301NB	2
Specification			
Speaker			
Enclosure type: Closed			
Unit: 10cm full range speaker			
Frequency response: 70Hz to 15KHz or wider			
Sound Pressure Level: 85dB /W (1m)			
Maximum SPL: 98dB			
Amplifier			

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Input: Unbalanced 6.3mm jack input			
Rated output: 20W or more			
Distortion (T.H.D.): 0.05% (1kHz / 1W output) or better			
Residual Noise: -70dBV or less			
Input Sensitivity: -14dBV (0.2Vr.m.s.) or better			
Input impedance: 10kΩ or more			
Operating temperature range: -10 to 50°C or wider			
Operating humidity range (non condensing): 0% to 90% or wider			
Dimensions:			
Depth: 120mm or less			
Width: 120mm or less			
Height: 190mm or less			
Weight: 2.2kg or less			
Power supply: AC100-240V 50/60Hz			
Power consumption: 10W or less			
Accessories: Manufacturer standard accessories			
4.2.3.4 Mount Kit			
Specification			
Use: Mounting kit for 4.2.3.3 Active Speaker	Broadcast Solutions	Custom Build	2
4.2.4 Audio Monitoring			
4.2.4.1 Audio Monitor	Black Magic Design	BM-HDL-AUDMON1RU12G	1
Specification			
Rackmount Audio Monitor: including followings			
SDI Video Inputs: 1			
SDI Video Outputs: 1 loop out			
SDI Rates: 270Mb, 1.5G, 3G, 6G, 12G.			
HDMI 2.0 Video Outputs: 1			
Multi Rate Support:			
SDI and HDMI are switchable between standard definition, high definition and ultra high definition.			
SDI Video Loop: 1 x reclocked 10-bit SD/HD/3G-SDI, 6G-SDI and 12G-SDI.			
Analog Audio Inputs: 2 x XLR. 2 x RCA HiFi			
Analog Audio Outputs: 1 x 6.5mm headphone socket			
Digital Audio Inputs: 1 x XLR			
Built in Speaker: Stereo with 2-way crossover and independent stereo subwoofers			
AES/EBU Audio Inputs: 2 channels balanced 110Ω AES/EBU via XLR			
SDI Audio Inputs: 16 channels embedded in SD, HD and UltraHD 4K			
SDI Audio Outputs: 16 channels embedded audio loop out			
HDMI Audio Outputs: 8 Channels embedded in SD, HD and 4K			
Ethernet: 1Gb/sec for configuration and firmware updates			
Computer Interface: USB-C for configuration and firmware			
Metering:			
2 x 27 RGB segment LED VU, PPM or Loudness meters			
Modes:			
Push button interface allows for input selection, channel selection, independent left and right audio, mute and volume control with scroll wheel			
Display:			
Display Size: 2.2 inch diagonal color LCD or superior			
Display Resolution: 320 x 240 or bigger			
Operating temperature range: 0 to 40°C or wider			
Operating humidity range (non condensing): 0% to 90% or wider			
Dimensions:			
Depth: 245mm or less			
Width: 483mm or less			
Height: 44mm or less			
Weight: 2.8kg or less			
Power supply: AC100-240V 50/60Hz			
Power consumption: 55W or less			
Accessories: Manufacturer standard accessories			
4.3 INTERCOM			
4.3.1 Intercom Matrix, Operation Panel			
4.3.1.1 Digital Intercom	RTS	ODIN64	1
Specification			
Type: Compact 64 port, scalable Intercom Matrix			
AIO 4-Wire Analog: including followings			
Connectors: 16 RJ-45 connectors			
Signal Format: Differential RX/TX audio with differential RS-485 control data			
Wiring Scheme: Both 568B & USOC supported			
A/D and D/A Resolution: 24 bits			
Sample Rate: 48kHz			
Resolution: 24 bits			
Max Input Level (balanced): +20dBu or more without clipping			
Digital Input Gain: Programmable (-20dB – +20dB) or wider			
Input Frequency Response: +1dB/-3dB from 100Hz – +20kHz or wider			
Nominal Input Impedance: 22 kΩ or more			
Nominal Output Level: 8dBu or more			
Digital Output Gain: Programmable (-20dB – +20dB) or wider			
Maximum Output Level (balanced) at 600Ω: 20dBu or more without clipping			
Output Frequency Response: +1dB / -3dB from 100Hz – +20kHz or wider			
Output Noise Floor: -70dBu or less			

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Crosstalk Isolation: 80dB or more			
2-Wire Party Line Analog:			
Connector: two 3-pin female XLR connectors			
Modes/Port supported: including followings			
RTS CH1			
RTS CH2			
Audiocom (1 channel)			
Clear-Com (1 channel)			
4W/2W Echo Return Loss: 45dB or more			
Unbalanced Operation			
Expected Termination Impedance: 200Ω			
Noise Contribution: -70dBu or less			
THD+N (w/ nominal input): 0.5% or less, 200Hz – 7.3kHz			
Bridging Impedance: 10 kΩ or more			
Balanced Operation			
Expected Termination Impedance: 300Ω			
Noise Contribution: -70dBu or less			
THD+N (w/ nominal input): 0.5% or less, 200Hz – 7.3kHz			
Bridging Impedance: 10 kΩ or more			
General Purpose Input/Output Ports:			
Relays: (4 Relays)			
Type: SPDT or similar			
Contacts: Common (C) / Normally Closed (NC) / Normally Open (NO)			
Contact Rating 1A or more at 48Vdc			
Inputs (4 Inputs)			
Type: Optically Coupled			
Input Voltage: 5Vdc – 12Vdc or wider			
Control Port:			
Connector: RJ-45			
Format: IEEE 802.3 compliant			
Speed: 10/100/1000Mbps			
Sync Input Port:			
Connector: BNC			
Termination Impedance: 75Ω			
Input Frequency Range: 48kHz ±25 ppm or wider			
Input Level: 5V TTL Compatible			
IP (OMNEO) Port (primary and secondary):			
Maximum Capacity: 128 Full-duplex ports			
Copper Connector Type: RJ-45			
Format: IEEE 802.3 compliant			
Copper Ethernet Speed: 100/1000Mbps			
Fiber Connector Type: (SFP) Multimode or Single Mode.			
Fiber Speed: 100/1000Mbps			
Operating temperature range: 0 to 45°C or wider			
Dimensions:			
Depth: 365mm or less			
Width: 483mm or less			
Height: 44mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 47W or less			
Weight: 5.5kg or less			
Accessories: Manufacturer standard accessories			
4.3.1.2 Key Panel	RTS	KP-4016 A4F	10
Specification			
Type: 16 keys Color Display Key Panel			
LCD Display:			
Active area: 120.10mm (wide) x 18.77mm (high) or superior			
Dot resolution: 576 x 90 pixels or more			
Color resolution: 16-bit (64K) RGB color or superior			
Input; including followings			
Matrix			
Type: Balanced			
Typical input level: +8dBu			
Typical input impedance: 10kΩ or more			
Maximum input level: +20dBu or more			
Supported bandwidth: 100Hz to 20KHz or wider			
AUX 1 and AUX 2			
Type: Balanced			
Typical input level: +8dBu or more			
Typical input impedance: 10kΩ or more			
Front Panel Microphone			
Type: Electret			
Typical input level: -42dBu			
Typical input impedance: 1kΩ			
Maximum input level: -25dBu or more			
Rear Panel Microphone			
Type: Electret			
Typical input level: -42dBu			
Typical input impedance: 1kΩ			
Maximum input level: -25dBu or more			
Front and Rear Headset Microphone			
Type: Electret			

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Typical input level: -42dBu			
Typical input impedance: 1kΩ			
Maximum input level: -25dBu or more			
Front and Rear Headset Microphone			
Type: Dynamic			
Typical input level -50dBu			
Typical input impedance: 600Ω			
Maximum input level: -25dBu or more			
Headset connector: A4F			
Output: including followings			
Matrix			
Type: Balanced			
Typical output level:+8dBu			
THD+N%: 0.20% or less			
Typical output impedance: 600Ω			
Maximum output level: +20dBu			
Headset			
Maximum output power: 125mW for 32Ω load			
Earphone impedance: 16Ω and above			
THD+N%: 0.20% or less			
Speaker			
SPL: 84dB SPL or more for 1kHz sine wave @ 1 meter			
Digital Channel			
Typical latency: 1ms			
Frequency response; 20Hz - 20kHz			
Operating temperature range: 0 to 55°C or wider			
Dimensions:			
Depth: 100mm or less			
Width: 483mm or less			
Height: 44mm or less			
Weight: 1.6kg or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 15W or less			
Accessories: Manufacturer standard accessories			
4.3.1.3 Microphone	RTS	MCP-90-12	9
Specification			
Generation element: Condenser, back-Electret			
Frequency response: 100Hz to15,000Hz or wider			
Polar pattern: Cardioid			
Open circuit voltage: 4.5mV (-47dB)/Pascal @ 1kHz			
Dynamic range: 102dB or more			
Power requirements: 1.5 to 9Vdc			
Knurled stem to head length: approx. 305mm			
Panel Microphone Connector Type: TRS, ¼ " phone jack with threaded female metal bushing			
Accessories: Manufacturer standard accessories			
4.3.1.4 Microphone	RTS	MCP-90-0	1
Specification			
Generation element: Condenser, back-Electret			
Frequency response: 100Hz to15,000Hz or wider			
Polar pattern: Cardioid			
Open circuit voltage: 4.5mV (-47dB)/Pascal @ 1kHz			
Dynamic range: 102dB or more			
Power requirements: 1.5 to 9Vdc			
Knurled stem to head length: 0mm			
Panel Microphone Connector Type: TRS, ¼ " phone jack with threaded female metal bushing			
Accessories: Manufacturer standard accessories			
4.3.1.5 Headset	RTS	LH-300-DM-A4M	10
Specification			
Headphone: including followings			
Type: Dynamic			
Impedance: 300Ω			
Frequency response: 200Hz – 10kHz (-10dB ref. 1kHz)			
Sensitivity: 100 ± 4dB SPL @ 1kHz & 1mW			
Microphone			
Element type: Noise-Canceling Dynamic			
Impedance: 300Ω			
Frequency response: 200Hz – 6.5kHz (-10dB ref. 1kHz)			
Sensitivity: -63 ± 3.5dB ref: 1V/Pa @ 1kHz			
Connector type: A4M			
Accessories: Manufacturer standard accessories			
4.3.1.6 Mixer	ART	MX821S	2
Specification			
Type: 8 Ch Mic / Line Audio Mixer			
Input Connections: including followings			
XLR female balanced (Mic, channels 1-8)			
1/4-inch TS unbalanced (Line, channels 1-8)			
RCA unbalanced (Aux Bus In, Left and Right)			
Output Connections: including followings			
1/4-inch TRS balanced (Main Outputs, Left and Right)			

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RCA unbalanced (Prefade Out, Left and Right)			
Input impedance: 2kΩ (Mic), 20kΩ (Line), 51kΩ (Aux Bus In)			
Output impedance: 200Ω (Main Outputs, balanced), 100Ω (Prefade Out)			
Frequency response: 20Hz – 20kHz (+0, -1dB) (CH 1-8 in, Main out)			
THD: 0.01% or less @ 1kHz, typical			
Phase response: All connections shall be phase coherent			
Signal to noise ratio: 99dB or better (Ref 0dBu)			
CMRR: 43dB or more			
Maximum input level: -4dBu (Mic), +22dBu (Line) or more			
Maximum output level: +24dBu (balanced), +18dBu (unbalanced) or more			
Maximum gain: 54dB (Mic), 29dB (Line) or more			
Phantom Power: Switch selectable, +48V DC (regulated and filtered), 7mA current limiting per leg			
Dimensions:			
Depth: 160mm or less			
Width: 483mm or less			
Height: 45mm or less			
Weight: 3kg or less			
Power supply: AC100-240V 50/60Hz			
Power consumption: 15W or less			
Accessories: Manufacturer standard accessories			
4.3.1.7 Distribution Amplifier	sonifex	RB-DA6G	2
Specification			
Maximum input level:+28dBu or more			
Maximum output level:+28dBu or more			
Frequency response: 20Hz to 20kHz ±0.1dB (600Ω load, ref 1kHz)			
Gain range: Adjustable 8dB loss to 18dB gain (12 adjustable pots)			
Common mode rejection: 66dB typical			
Input impedance: 20kΩ bridging or more			
Output impedance: 50Ω or less			
Distortion: 0.01% THD @ 1kHz, ref +8dBu output			
Noise: -88dB unity gain, ref +8dBu output			
Connections: including followings			
Inputs: 2 x XLR 3 pin female (balanced, can be unbalanced)			
Outputs: 12 x XLR 3 pin male (balanced, can be unbalanced)			
Dimensions:			
Depth: 108mm or less			
Width: 480mm or less			
Height: 42mm or less			
Weight: 1.9kg or less			
Power supply: 220-240Vac 50/60Hz			
Power consumption: 6W or less			
Accessories: Manufacturer standard accessories			
4.3.2 Commentary Panel			
4.3.2.1 Commentary Unit	Glensound	Express ip MkII	2
Specification			
Features: including followings			
Two commentary positions			
Dante network audio interface			
Four external monitor inputs			
Sidetone (own voice) monitor circuit			
Other commentator monitor circuit			
Two common talkback circuits			
Operation of talkback buttons configurable			
Mic inputs with selectable 48v phantom power			
Microphone Input:			
Microphone Gain (Dynamic): 54dB or more			
Microphone Gain (Phantom Power): 44dB (37dB via internal link) or more			
Input Impedance: 1kΩ			
Noise at Channel Outputs: -70dB or less (22Hz - 22kHz A weighted 300Ω termination)			
Noise at Mix Output: -67dB or less (22Hz - 22kHz A weighted 300Ω termination)			
Phantom Power: 48V at 9.7mA			
Compressor/Limiter			
Type: Complex multi-point curve			
Input Level : Output Level			
-54 : 0			
-44 : +5			
-34 : +8.5			
-24 : +10			
-19 : +12.5			
Headroom : 35dB or similar			
Network Interface			
Ethernet RJ45			
Signal Path (Input to Output)			
Frequency Response: Flat : 53Hz to 10.5kHz or wider			
Frequency Response: -1dB : 40Hz to 15.2kHz or wider			
Frequency Response: -3dB : 30Hz to 22kHz or wider			
Distortion: -44dB input : 100Hz 0.04% or less : 1kHz 0.01% or less : 10kHz 0.006% or less			
Headphone			
Line input impedance: 47kΩ or more			
Frequency Response from Inputs: +/-2dB 50Hz to 24kHz or wider			
Gain/ Loss Range: Off to + 10dB			

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Headphone Impedance: 35 - 1000Ω			
Operating temperature range: 0 to 50°C or wider			
Operating humidity range (non condensing): 0% to 95% or wider			
Dimensions:			
Depth: 250mm or less			
Width: 220mm or less			
Height: 100mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 4W or less			
Weight: 1.5kg or less			
Accessories: Manufacturer standard accessories			
4.3.2.2 Headset	AUDIO-TECHNICA	BPHS1	4
Specification			
Type:			
Closed-back Dynamic (Headphone)			
Cardioid Dynamic (Microphone)			
Driver Diameter: 40mm (Headphone) or similar			
Frequency Response:			
20-20,000Hz (Headphone) or wider			
40-20,000Hz (Microphone) or wider			
Maximum Input Power: 1600mW at 1kHz or more			
Sensitivity:			
100dB (Headphone) or better			
-57dB (1.4mV) re 1V at 1 Pa (Microphone) or better			
Impedance:			
65Ω (Headphone) or similar			
560Ω (Microphone) or similar			
Weight: 264g or similar			
Cable: 3.3 m with 8-pin connector at headset end; 3-pin XLRM-type connector (microphone) and 6.3mm phone plug (headphone) outputs or similar			
Magnet: Neodymium (Headphone)			
Voice Coil: Copper-clad aluminum wire			
Accessories: Manufacturer standard accessories			
4.3.2.3 Mini Gigabit Ethernet Media Converter	FS.COM	MMC-GASFP-V	4
Specification			
Type: Mini Unmanaged Ethernet Media Converter			
Ports:			
1 x 10/100/1000Base-T RJ45 port for Ethernet connection			
1 x Hot swappable SFP port for 1G fiber connection			
Operating temperature range: 0 to 40°C or wider			
Operating humidity range (non condensing): 0% to 90% or wider			
Dimensions:			
Depth: 90mm or less			
Width: 60mm or less			
Height: 20mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Accessories: Manufacturer standard accessories			
4.3.2.4 SFP	FlexOptix	S.B1512.10.DL	2
Specification			
Form Factor: SFP			
Connector/Polish: LC simplex/UPC			
Interface: Singlemode BiDi			
Distance: 10km or more			
Bandwidth: 125 Mbit/s - 1.25 Gbit/s			
Power budget: 12dB or more			
Wavelength TX: 1550 nm typical			
Wavelength RX: 1310 nm typical			
Supported Protocols: 1G Fibre Channel, Fast Ethernet, Gigabit Ethernet			
Operating temperature range: 0 to 70°C or wider			
4.3.2.5 SFP	FlexOptix	S.B1312.10.DL	2
Specification			
Form Factor: SFP			
Connector/Polish: LC simplex/UPC			
Interface: Singlemode BiDi			
Distance: 10km or more			
Bandwidth: 125 Mbit/s - 1.25 Gbit/s			
Overbudget: 12dB or more			
Wavelength TX: 1310 nm typical			
Wavelength RX: 1550 nm typical			
Supported Protocols: 1G Fibre Channel, Fast Ethernet, Gigabit Ethernet			
Operating temperature range: 0 to 70°C or wider			
4.3.2.6 Flight Case	Broadcast Solutions	custom build	2
Specification			
Use: for transportation of commentary equipment			
Durability: shall be strong enough in harsh environment			
Size/shape/composition: to be proposed			
4.3.2.7 Fiber Cable	Broadcast Solutions	custom made	2

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Specification			
Type: Both-end connectorized duplex fibre cable coiled on cable drum			
Fiber cable type: Singlemode, 2 fibers			
Length: 150 m			
Connector type: Aluminum waterproof LC connectors			
Drum type: CDR 310 or similar			
4.3.3 Wireless Intercom System			
4.3.3.1 Universal Radio Interface			
Specification			
Universal radio interface to link wired communication systems with radio systems	RIEDEL	RiFace G2 DM4000 Series Dual	1
19"2RU interface includes two radios, processor logic to control the radios as well as circuitry to adjust the levels of the various audio sources			
RF Bands: including			
66-88MHz			
136-174MHz			
403-440MHz			
450-470MHz			
450-520MHz			
RF Power: 1 - 6Watts or wider			
Operation: simplex, semi duplex			
Inputs: transformer balanced +6dB line in/out			
Outputs: N-type antenna connector			
Compatible Radios: including DM4000			
Weight : 10kg or less			
Dimensions: 19"2 RU, 367mm depth			
Accessories: Manufacturer standard accessories			
4.3.3.2 Mobile Radio	RIEDEL	DM4400E UHF LP	2
Specification			
Frequency coverage: including 403-470MHz			
Number of channels: 99 channels or more			
Channel spacing: including 12.5kHz, 20kHz, 25kHz			
Power supply requirement: 12Vdc nominal			
Antenna impedance: 50Ω			
Maximum TX output power: 25W or more			
TX frequency stability: ±1.0 ppm or better			
TX adjacent channel power: 60dB (12.5kHz channel), 70dB (20/25kHz channel) or better			
RX sensitivity (5% BER): 0.2μV or less			
IP rating: IP54 or better			
Operating temperature range: -30 to 60°C or wider			
Dimensions:			
Depth: 220mm or less			
Width: 180mm or less			
Height: 55mm or less			
TX max. current drain: 11A (25W Output)			
Weight: 2kg or less			
Accessories: Manufacturer standard accessories			
4.3.3.3 Portable Radio	RIEDEL	DP4400E UHF	5
Specification			
Model: Full keypad model			
Frequency coverage: including 403-470MHz			
Number of channels: 1000 channels			
Channel spacing: including 12.5kHz, 20kHz, 25kHz			
Power supply requirement: 7.4Vdc nominal or similar			
Antenna impedance: 50Ω			
Maximum TX output power: 4W			
TX frequency stability: ±1.0 ppm or better			
TX adjacent channel power: 60dB (12.5kHz channel), 70dB (20/25kHz channel) or better			
RX sensitivity (5% BER): 0.2 μV or less			
Battery: Li-ion, 2450mAh			
IP rating: IP67 or better			
Operating temperature range: -30 to 60°C or wider			
Dimensions:			
Depth: 36mm or less			
Width: 55mm or less			
Height: 130mm or less			
Weight: 350g or less			
Accessories: Manufacturer standard accessories			
4.3.3.4 Battery	RIEDEL	DP4xxx additional battery	5
Specification			
Use: for 4.3.3.3 Portable Radio			
Battery: Li-ion, 2450mAh			
4.3.3.5 Charger	RIEDEL	DP2xxx,3xxx,4xxx 6 way charger	1
Specification			
Type: 6-bay multi charger for 4.3.3.3 Portable Radio			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			

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4.3.3.6 Headset	RIEDEL	AIR-E1 PTT (MTP850S,DP3400/3600/4400/4600/ 4800)	5
Specification			
Features:			
Light weight radio with PTT			
Rotatable boom for left or right side use,			
Single-earpiece headset			
Noise cancelling electret microphone			
Headphone			
Transducer type: Dynamic, open			
Frequency response: 100Hz - 18kHz or wider			
Microphone			
Transducer type: NC Electret			
Polar Pattern: Bi-directional			
Frequency response: 150Hz - 15kHz or wider			
Supply voltage: 4.5V 400uA or similar			
Sensitivity: -51dB +/- -2dB or better			
Accessories: Manufacturer standard accessories			
4.3.3.7 Antenna	RIEDEL	MSAUHF RiFace Car-Antenna UHF 430-470 MHz	2
Specification			
Type: UHF Car-Antenna including jumper-cable FME-N/female			
Frequency coverage: including 430-470MHz			
4.3.3.8 Wireless Transceiver	RTS	TR-1800EU	4
Specification			
Type Belt clip type small transceiver			
Audio Modes: including G.722 wideband mode / G.726 narrowband mode			
Frequency Response (G.722): 165Hz – 7.0kHz or wider			
Frequency Response (G.726): 255Hz – 3.6kHz or wider			
Removable Battery Pack: Li-Ion Pack, 7.5Vdc, 2300mAh or similar			
Typical Battery Life: 17 hours or more			
RF Communications:			
Frequency Range: 1880 – 1900MHz or wider			
Communication Protocol: including DECT			
Carrier Frequency Selection: Automatic via DCS (Dynamic Channel Selection)			
Modulation: including GFSK			
Maximum Output Power (Peak): 200mW or more			
Average Power (G.722 wideband): 17mW or more			
Average Power (G.726 narrowband): 8mW or more			
Operating temperature range: 0 to 50°C or wider			
Dimensions:			
Depth: 60mm or less			
Width: 110mm or less			
Height: 130mm or less			
Weight: 305g or less			
Accessories: Manufacturer standard accessories			
4.3.3.9 Headset	RTS	LH-300-DM-A4M	4
Specification			
Type Single sided lightweight headset			
Headphone			
Transducer type: Dynamic			
Frequency response: 100Hz - 10kHz or wider			
Microphone			
Transducer type: Noise-Canceling Dynamic			
Frequency response: 200Hz - 6.5kHz or wider			
Supply voltage: 4.5V 400uA or similar			
Sensitivity: -63dB +/- -3.5dB or better			
Connector: A4M 4 pin male XLR			
Accessories: Manufacturer standard accessories			
4.3.3.10 Access Point	RTS	AP-1800EU	1
Specification			
Type: Digital wireless communications Access Point			
Audio Modes: including G.722 wideband mode / G.726 narrowband mode			
Max. transceiver per Point (G.722): 5 or more			
Max. transceiver per Point (G.726): 5 or more			
Connectivity: Standard 100Base-T or GigE Ethernet			
Connections:			
Ethernet Connectors: 2 x Standard RJ-45 Jacks			
RF Connectors: SMA-F			
RF Communications:			
Frequency Range: 1880 – 1900MHz or wider			
Communication Protocol: including DECT			
Carrier Frequency Selection: Automatic via DCS (Dynamic Channel Selection)			
Modulation: including GFSK			
Maximum Output Power (Peak): 200mW or more			
Average Power (G.722 wideband): 17mW or more			
Average Power (G.726 narrowband): 8mW or more			
Operating temperature range: 0 to 50°C or wider			

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Dimensions:			
Depth: 40mm or less			
Width: 200mm or less			
Height: 140mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 60W or less			
Weight: 450g or less			
Accessories: Manufacturer standard accessories			
4.3.3.11 Charger	RTS	CHG-240	4
Specification			
Type: 4-bay multi charger for 4.3.3.8 Wireless Transceiver			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
4.3.3.12 Flight Case	Broadcast Solutions	custom build	1
Specification			
Use: for transportation of wireless equipment			
Durability: shall be strong enough in harsh environment			
Size/shape/composition: to be proposed			
4.3.3.13 Cable	Broadcast Solutions	12896	1
Specification			
Type: Both-end connectorized CAT7 cable coiled on cable drum			
Cable type: CAT7A cable			
Assembled with RJ45 CAT7 connector			
Jacket color: to be proposed			
Length: 100m			
Drum type: IT 266 RM or similar			
4.4 TELEPHONE HYBRID			
4.4.1 Telephone Hybrid	AVT	802015	1
Specification			
Features: including followings			
1 Channel with 1 Hybrid, AGC, Echo-Canceller			
1 x LAN (control, optional VoIP), 1 x POTS (optional)			
Either VoIP, POTS or both can be equipped			
1 x Phone			
2 x Analogue Audio			
Web browser control & configuration			
Line interface: including followings			
POTS (optional): 1 x POTS RJ12			
LAN: 1 x LAN, RJ45			
Pretalk interface: including followings			
Telephone: 1 x PHONE, RJ12			
Control Interface: including followings			
LAN: RJ45 (same as line interface)			
TTL/RELAY: SUB-D socket			
2 x Relay: function can be programmed			
Capacity: 48V/200mA			
4x TTL Input/Output: function can be programmed			
Capacity: 3.3V/10mA			
Audio Interface: including followings			
Analogue Audio:			
Electronically balanced input: XLR female			
Electronically balanced input: XLR male			
Nominal level: -3 to +9dBu (can be programmed)			
Head room: 0 to 15dB (can be programmed)			
Input impedance: 25kΩ or more			
Output impedance: 50Ω			
Frequency response: 50Hz to 7kHz			
Signal to noise ratio: 80dB or more			
Noise: -92dB or less			
Signal Processing including followings			
AGC per channel: configurable			
Level adjustment control during connection: -16dB to +16dB			
Echo canceller per channel: 100ms echo cancelling time			
Expander per channel: configurable			
Display including followings			
Graphical resolution: 160 x 32 Pixels			
Illuminated: can be switched off			
Operating temperature range: 5 to 45°C or wider			
Operating humidity range (non condensing): 5% to 85% or wider			
Dimensions:			
Depth: 220mm or less			
Width: 220mm or less			
Height: 45mm or less			
Weight: 1.7kg or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 15W or less			
Accessories: Manufacturer standard accessories			
4.4.2 POTS Option	AVT	430641	1
Specification			

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Use: POTS Option for 4.4.1 Telephone Hybrid			
4.4.3 GSM Adapter	AVT	490135	1
Specification			
Analogue telephone line: including followings			
Telephone interface: 2-wires			
Telephone connector: RJ 11			
Impedance: 600Ω ± 20%			
Dial tone: DTMF			
Supply conduction: 24V			
Current loop: max 29mA			
Resistance of subscribers conduction: max. 500Ω			
Ringing: 55Vef / 50Hz			
Signalization: 425Hz ±20Hz			
GSM:			
Mobile network: Quad-Band 850/900/1800/1900Mhz			
Provider: according SIM card (3V and 1.8V)			
USB: version 1.1, virtual COM			
Operating temperature range: -20 to 40°C or wider			
Operating humidity range (non condensing): 10% to 80% or wider			
Dimensions:			
Depth: 130mm or less			
Width: 100mm or less			
Height: 37mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Accessories: Manufacturer standard accessories			
4.5 MICROPHONE & ACCESSORIES			
4.5.1 Wired Microphone			
4.5.1.1 Gun Microphone			
4.5.1.1.1 Shotgun Microphone	Sennheiser	MKH 416 P 48	8
Specification			
Type: Short shotgun microphone			
Frequency response (Microphone): 40 - 20kHz or wider			
Transducer principle (Microphone): RF condenser microphone			
Pick-up pattern: super-cardioid/lobar			
Sensitivity in free field, no load (1kHz): 5mV/Pa +- 1dB or better			
Nominal impedance: 25Ω			
Min. terminating impedance: 800Ω			
Equivalent noise level:			
A-weighted (DIN IEC 651): approx.13dB			
ITU-R weighted (ITU-R 468): approx. 24dB			
Maximum sound pressure level: 130dB or more at 1kHz			
Power supply phantom: 48 ± 12V			
Supply current: 2mA			
Dimensions: Ø 19 x 250mm or smaller			
Weight: approx. 165g			
Accessories: Manufacturer standard accessories			
4.5.1.1.2 Microphone Grip/Stand	Sennheiser	MZS 20-1	8
Specification			
Type: Pistol grip for use with 4.5.1 Shotgun Microphone			
4.5.1.1.3 Wind Muff	Sennheiser	MZH 60-1	8
Specification			
Type: Hairy cover made from long-haired polyester fleece provides maximum protection against wind noise			
Use: for use with 4.5.1 Shotgun Microphone			
4.5.1.1.4 Windscreen	Sennheiser	MZW 60-1	8
Specification			
Lightweight, rugged protective basket windshield provides excellent suppression of wind noise when used for outdoor applications.			
Length: approx. 44cm.			
Use: for use with 4.5.1 Shotgun Microphone			
4.5.1.2 Wired Microphone			
4.5.1.2.1 Microphone	Sennheiser	MKE 2-ew-GOLD	2
Specification			
Omnidirectional Lavalier Condenser Microphone (with Accessories, Black)			
Dimensions: Ø 4.8mm			
Connector: jack			
Frequency response (Microphone): 20 - 20000Hz +- 3dB			
Transducer principle (Microphone): pre-polarized condenser			
Pick-up pattern: omni-directional			
Sensitivity in free field, no load (1kHz): 5mV/Pa +- 3dB			
Nominal impedance: 1000Ω			
Min. terminating impedance: 4700Ω			
4.5.1.2.2 Microphone	Sennheiser	MKE 40-ew	2
Specification			
Cardioid Lavalier Microphone			
Dimensions: Ø 12 x 26mm or similar			

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Connector: jack			
Frequency response (Microphone): 40 - 20000Hz			
Transducer principle (Microphone): pressure gradient			
Pick-up pattern: cardioid			
Sensitivity in free field, no load (1kHz): 42mV/Pa, ± 2.5dB			
Rated impedance: approx. 3 kΩ			
Min. terminating impedance: 15 kΩ			
4.5.1.2.3 Power Adapter	Sennheiser	MZA 900 P	4
Specification			
Frequency response: 20 – 20,000Hz (–1dB) or better			
Pre-attenuation, switchable: including 0/–12dB			
Roll-off filter, switchable: 125Hz (–3dB), 12dB/oct or better			
Max. output voltage at			
0dB pre-attenuation: 1.8V (P48), 0.6V (P12)			
–12dB pre-attenuation: 0.45V (P12 – P48)			
Noise voltage at the output: CCIR:12 μV (0/–12dB), A:3 μV (0/–12dB) or less			
Output impedance: 100Ω			
Min. load impedance at			
0dB pre-attenuation: 5kΩ (P12 – P48)			
–12dB pre-attenuation: 2kΩ (P12 – P48)			
Power supply: P12 – P48, 10 – 52V, 2.6 – 2.8mA			
Connector: XLR-3 M			
Input socket: 3.5mm jack socket, lockable			
Dimensions: Ø 19 x 100mm or similar			
Operating temperature range: -20 °C to 60 °C or wider			
Accessories: Manufacturer standard accessories			
4.5.1.2.4 Microphone	Sennheiser	e 835 S	2
Specification			
Transducer principle: dynamic			
Frequency response: 40 to 16kHz or wider			
Pick-up pattern: cardioid			
Sensitivity (free field, at 1kHz): 2.7mV/Pa			
Nominal impedance (at 1kHz): 350Ω			
Min. terminating impedance: 1 kΩ			
Connector: XLR-3			
Operating temperature range: 0 °C to 40 °C or wider			
Dimensions Ø 48 x 180mm or similar			
Weight 330g or less			
Accessories: Manufacturer standard accessories			
4.5.1.2.5 Microphone	Sennheiser	e 865	2
Specification			
Transducer principle: Pre-polarized condenser microphone			
Frequency response: 40 to 20kHz or wider			
Pick-up pattern: Super-cardioid			
Sensitivity (free field, at 1kHz): 3mV/Pa			
Nominal impedance (at 1kHz): 200Ω			
Min. terminating impedance: 1kΩ			
Max. sound pressure level (at 1kHz): 150dB or more			
Connector: XLR-3			
Operating temperature range: 0 °C to 40 °C or wider			
Dimensions Ø 47 x 193mm or similar			
Weight 320g or less			
Accessories: Manufacturer standard accessories			
4.5.1.3 Microphone Stand			
4.5.1.3.1 Microphone Stand	K&M	210/9 Black	4
Specification			
Boom arm: 2-piece telescopic design			
Boom arm clamping: T-bar locking screw			
Boom arm length: from 435 to 745mm or wider			
Height: from 900 to 1,605mm or wider			
Height adjustment: Clutch			
Leg construction: Socket with foldable legs			
Material: Steel			
Rod combination: 2-piece folding design			
Size when folded: 105 x 85 x 985mm			
Threaded connector: 3/8"			
Type: black			
Weight: 3.1kg or similar			
Accessories: Manufacturer standard accessories			
4.5.1.3.2 Low Microphone Stand	K&M	25910 Black	8
Specification			
Boom arm: one-piece design			
Boom arm clamping: T-bar locking screw			
Boom arm length: 525mm or similar			
Height: 280mm or similar			
Leg construction: Socket with foldable legs			
Material: steel			
Threaded connector: 3/8"			

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Type: black			
Weight: 1.9kg or similar			
Accessories: Manufacturer standard accessories			
4.5.2 Wireless Microphone & IEM			
4.5.2.1 Wireless Vocal Set	Sennheiser	EW-D 835-S SET (R1-6)	2
Specification			
System			
Audio link frequency range: 520 - 576MHz			
Bluetooth Low Energy (BLE) frequency range: 2402 - 2480MHz			
Audio frequency response: 20Hz - 20kHz (-3dB) at 3dBfs			
Audio THD: -60dB or less for 1kHz at 3dBfs input level			
Dynamic range: 134dB or more			
System latency: 1.9ms or less			
Operating temperature range: -10 °C - +55 °C or wider			
Relative humidity: 5 - 95 % (non-condensing) or wider			
Rack Receiver			
Input voltage: 11 - 13Vdc or wider			
Input current: 300mA or less			
Transmit power (radiated) BLE: max. 10mW EIRP			
Audio output power: 18dBu max.			
Dimensions:			
Depth: 190mm or less			
Width: 220mm or less			
Height: 44mm or less			
Weight: approx. 1kg			
Bodypack Transmitter			
Input voltage: 2.0 - 4.35V or wider			
Input current: 300mA or less			
Power supply: 2 x AA batteries 1.5V (alkali manganese) or BA 70 rechargeable battery pack			
Occupied bandwidth: 200kHz			
Transmit power (radiated):			
Audio link: 10mW ERP			
BLE: max. 10mW EIRP			
Dimensions (without antenna):			
Width: 50mm or less			
Height: 170mm or less			
Weight (without batteries): approx. 305g			
Microphone			
Transducer principle: dynamic			
Sensitivity: 2.1mV/Pa or better			
Sound pressure level: 154dB SPL or better			
Pick-up pattern: cardioid			
Accessories: Manufacturer standard accessories			
4.5.2.2 Wireless Lavalier Microphone	Sennheiser	EW-D ME2 SET (R1-6)	2
Specification			
System			
Audio link frequency range: 520 - 576MHz			
Bluetooth Low Energy (BLE) frequency range: 2402 - 2480MHz			
Audio frequency response: 20Hz - 20kHz (-3dB) at 3dBfs			
Audio THD: -60dB or less for 1kHz at 3dBfs input level			
Dynamic range: 134dB or more			
System latency: 1.9ms or less			
Operating temperature range: -10 °C - +55 °C or wider			
Relative humidity: 5 - 95 % (non-condensing) or wider			
Rack Receiver			
Input voltage: 11 - 13Vdc or wider			
Input current: 300mA or less			
Transmit power (radiated) BLE: max. 10mW EIRP			
Audio output power: 18dBu max.			
Dimensions:			
Depth: 190mm or less			
Width: 220mm or less			
Height: 44mm or less			
Weight: approx. 1kg			
Bodypack Transmitter			
Input voltage: 2.0 - 4.35V or wider			
Input current: 300mA or less			
Power supply: 2 x AA batteries 1.5V (alkali manganese) or BA 70 rechargeable battery pack			
Occupied bandwidth: 200kHz			
Transmit power (radiated):			
Audio link: 10mW ERP			
BLE: max. 10mW EIRP			
Dimensions (without antenna):			
Depth: 20mm or less			
Width: 65mm or less			
Height: 80mm or less			
Weight (without batteries): approx. 120g			
Lavalier Microphone			
Transducer principle: Pre-polarized condenser microphone			
Pick-up pattern: Omni-directional			
Sensitivity (free field, no load) (1kHz): 17mV/Pa or better			

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Max. SPL at 1kHz: 130dB or more			
Frequency response: 50 to 18kHz or wider			
Equivalent noise level (A-weighted): 32dB or less			
Connector: 3.5mm jack			
Cable length: approx. 1.6m			
Supply voltage: 7.5V			
Accessories: Manufacturer standard accessories			
4.5.2.3 Wireless stereo IEM Set	Sennheiser	XSW IEM SET	1
Specification			
Stereo Transmitter			
RF characteristics			
Modulation: FM stereo			
Frequency range: 572 - 596MHz			
Max. RF output power: 30mW			
Switching bandwidth: up to 24MHz			
Nominal/peak deviation: ±15kHz / ±24kHz			
Antenna output: BNC socket, 50Ω			
AF characteristics			
AF frequency response: 45Hz to 15kHz or wider			
AF input: 2x XLR-3/4" (6.3mm) jack, balanced, combo socket, or equivalent			
Total harmonic distortion (THD): 0.9% or less			
Signal-to-noise ratio (at nominal load and peak deviation): 88dB or more			
Operating temperature range: 0 to 40°C or wider			
Dimensions:			
Depth: 130mm or less			
Width: 200mm or less			
Height: 45mm or less			
Power supply: 12Vdc			
Weight: 0.8kg or less			
Accessories: Manufacturer standard accessories			
Stereo Receiver			
RF characteristics			
Modulation Wideband: FM			
Frequency ranges: 572 - 596MHz			
Switching bandwidth: up to 24MHz			
Nominal/peak deviation: ±15kHz / ±24kHz			
Squelch: 10μV, fixed			
AF characteristics			
Signal-to-noise ratio (1mV, peak deviation): 88dB or more			
Total harmonic distortion (THD): 1% or less			
AF output level at 3.5mm: 2 x 1,25Veff at 16Ω or similar			
High Boost (EQ): +10dB at 13kHz or similar			
Limiter: -10dB or similar			
AF frequency response: 45Hz to 15kHz or wider			
Cross talk (50Hz - 10kHz): approx. 45dB			
Operating temperature range: 0 to 40°C or wider			
Dimensions:			
Depth: 30mm or less			
Width: 70mm or less			
Height: 95mm or less			
Power supply: 2 x AA batteries 1.5v			
Nominal voltage: 3V battery			
Weight: 110g or less			
Accessories: Manufacturer standard accessories			
In-ear headphones			
Transducer: dynamic			
Frequency response: 40 to 20kHz or wider			
SPL (1kHz, 1mW): 106dB or more			
Nominal impedance: 6Ω			
Cable length: approx. 1.4m			
Connector: 3.5mm (1/8") stereo plug, gold-plated			
Operating temperature range: -5 to 50°C or wider			
4.5.2.4 Additional Stereo IEM Receiver	Sennheiser	XSW IEM EK	1
Specification			
Stereo Receiver			
RF characteristics			
Modulation Wideband: FM			
Frequency ranges: 572 - 596MHz			
Switching bandwidth: up to 24MHz			
Nominal/peak deviation: ±15kHz / ±24kHz			
Squelch: 10μV, fixed			
AF characteristics			
Signal-to-noise ratio (1mV, peak deviation): 88dB or more			
Total harmonic distortion (THD): 1% or less			
AF output level at 3.5mm: 2 x 1,25Veff at 16Ω or similar			
High Boost (EQ): +10dB at 13kHz or similar			
Limiter: -10dB or similar			
AF frequency response: 45Hz to 15kHz or wider			
Cross talk (50Hz - 10kHz): approx. 45dB			
Operating temperature range: 0 to 40°C or wider			
Dimensions:			

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Depth: 30mm or less			
Width: 70mm or less			
Height: 95mm or less			
Power supply: 2 x AA batteries 1.5v			
Nominal voltage: 3V battery			
Weight: 110g or less			
Accessories: Manufacturer standard accessories			
4.5.2.5 Antenna	Sennheiser	ADP UHF	3
Specification			
Type: Passive external directional antenna			
Impedance: 50Ω			
Gain: 5dBi or more			
Frequency range: 470 – 1075MHz or wider			
Dimensions: 319 x 310mm or similar			
Weight: 1.4kg or similar			
4.5.2.6 Splitter	Sennheiser	ASA 3000	1
Specification			
Type: Active wideband antenna splitter			
Number of channel: 16 (8 dual receivers) or more			
RF frequency range: 470 - 870MHz or wider			
Transmission loss: 0dB			
Antenna connector: BNC			
Nominal impedance: 50Ω			
Dimensions:			
Width: 445mm or less			
Depth: 200mm or less			
Height: 45mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Weight: 3kg or less			
Accessories: Manufacturer standard accessories			
4.5.2.7 Flight Case	Broadcast Solutions	custom build	1
Specification			
Use: for transportation of wireless transmitter/receiver, IEM set			
Durability: shall be strong enough in harsh environment			
Size/shape/composition: to be proposed			
4.5.2.8 Connection Panel	Broadcast Solutions	custom build	1
Specification			
Type: 1U, 19" rack mounting, audio connection panel			
Number of port: 16 XLR			
5 CONTROL			
5.1 CONTROL SYSTEM			
5.1.1 Server	hi	hiServe1	3
Specification			
CPU: Intel Xen E3-1270v5 or superior			
RAM: 32GB DDR4 or superior			
Storage: 256GB M2 NVMe PCIe x 4 or superior			
Ports: including 4x Ethernet 10-100-1000Mbps RJ45, 2x USB 3.0, 2x USB 2.0, 1x VGA 1x COM, 1x Dedicated IPMI LAN			
PSU: 1 x 200W Power Supply or better			
Dimensions:			
Depth: 290mm or less			
Width: 483mm or less			
Height: 45mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Accessories: Manufacturer standard accessories			
5.1.2 GPO Box	hi	hiContact	3
Specification			
Type: 1/3 19" 1RU GPIO box with 16 opto electrical inputs and 16 relays outputs			
Number of inputs: 16 or more			
Number of outputs: 16 or more			
Network connection: RJ45, 100Base-T ethernet with PoE			
PoE type: IEEE 802.3af – Type 1 Class 0 – 12.95W			
Operating temperature range: 10 to 35°C or wider			
Dimensions:			
Depth: 87mm or less			
Width: 140mm or less			
Height: 44mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 6W or less			
Weight: 520g or less			
Accessories: Manufacturer standard accessories			
5.1.3 Rack Mount	hi	hiContactMount	1
Specification			
19" 1RU Rackmount for up to 3x 1/3 19" 1RU GPIO boxes			
5.1.4 1Control Panel	hi	hiPush36 Mark 3	1

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Specification			
Type: 19" 1RU hardware panel with 36x buttons and 2x rotary encoders for operation			
Each button has a 64x32 pixel resolution LCD display to indicate the actual functionality.			
Number of switches: 36 or more			
Number of encoders: 2 or more			
Network connection: RJ45, 100Base-T ethernet			
Operating temperature range: 0 to 70°C or wider			
Dimensions:			
Depth: 45mm or less			
Width: 483mm or less			
Height: 44mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 20W or less			
Weight: 1.1kg or less			
Accessories: Manufacturer standard accessories			
5.1.5 Control Panel	hi	hiPush32 Shading Mark3	1
Specification			
Type: Panel with 32 high-contrast full-size LCD buttons and 2 rotary encoders			
Each button has a 64x32 pixel resolution LCD display to indicate the actual functionality.			
Designed for mounting in a half-19" 3RU slot, e.g. in a shading position			
5.1.6 Control Panel	hi	hiPush18	8
Specification			
Type: 19" 1RU hardware panel with 18x buttons and 2x rotary encoders for operation			
Each button has a 64x32 pixel resolution LCD display to indicate the actual functionality.			
Number of switches: 18 or more			
Number of encoders: 2 or more			
Network connection: RJ45, 100Base-T ethernet			
Operating temperature range: 0 to 70°C or wider			
Dimensions:			
Depth: 45mm or less			
Width: 483mm or less			
Height: 44mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 20W or less			
Weight: 1.1kg or less			
Accessories: Manufacturer standard accessories			
5.1.7 Control Panel	hi	hiPush20	1
Specification			
Type: 19" 1RU hardware panel with 20x buttons for operation			
Each button has a 64x32 pixel resolution LCD display to indicate the actual functionality.			
Number of switches: 20 or more			
Network connection: RJ45, 100Base-T ethernet			
Operating temperature range: 0 to 70°C or wider			
Dimensions:			
Depth: 45mm or less			
Width: 483mm or less			
Height: 44mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 20W or less			
Weight: 1.1kg or less			
Accessories: Manufacturer standard accessories			
5.1.8 Control Panel	hi	hiPSU	14
Specification			
External PSU for 19" 1RU Panels with 18x and 20x OLED buttons and 1RU GPIO box with 16 opto electronic inputs			
5.1.9. Software License	hi	hiBase	1
Specification			
incl. baseband features (excluding SDN and network monitoring functionalities)			
including two (2) user access licenses and active user rights management			
restricting access to resources and functionalities in the system by configuration.			
One license is reserved for the administrative user with full access to all resources.			
including drivers and protocol implementations according to agreed project specifications			
5.1.10 Redundancy License	hi	hiSwarm	1
Specification			
Enable hardware redundancy			
enables the systems distributed computing and load balancing mechanisms			
providing hardware redundancy to the system			
system runs distributed on multiple computing platforms and is this way resilient			
to hardware failures			
5.1.11 Software License	hi	hiGlue	1
Specification			
Glue software license to operate 1RU Panel with 18x OLED buttons, 1 RU Panel with 20 OLED buttons and 1RU GPIO box with 16 opto electronic inputs and 16 relays outputs. Supported also third party manufacturers panels.			
5.1.12 Access License	hi	hiUser	9

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Specification			
Add one (1) additional user access license			
5.1.13 Device Server	MOXA	NPort 5430	1
Specification			
Ethernet Interface			
10/100BaseT(X) Ports (RJ45 connector) x 1			
Serial Interface			
No. of ports: 4 or more			
Serial standard: including RS-422, RS-485			
Baud rate Supports (bps): including 50, 75, 110, 134, 150, 300, 600, 1200, 1800, 2400, 4800, 7200, 9600, 19200, 38400, 57600, 115200, 230.4k, 460.8k, 921.6k			
Operating temperature range: 0 to 55°C or wider			
Operating humidity range (non condensing): 5% to 95% or wider			
Dimensions:			
Depth: 105mm or less			
Width: 185mm or less			
Height: 35mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Power consumption: 4W or less			
Weight: 1.5kg or less			
Accessories: Manufacturer standard accessories			
5.2 IT INFRASTRUCTURE			
5.2.1 Desktop PC	HP Inc.	6B242EA#ABD	2
Specification			
Form factor - Mini			
CPU: Intel Core i5-12500T, 2GHz, 6 cores or superior			
RAM: 16GB DDR4 3200MHz or superior			
Graphics: Integrated, Intel UHD Graphics			
SSD: 512GB or superior			
Wireless: Bluetooth, WLAN			
Ports: including 1x Ethernet 10-100-1000Mbps RJ45, 1x USB 3.1 Type-C, 1x USB 3.1 Type-A, 1x USB 3.2 Type-C, 1x HDMI, 1x DisplayPort			
PSU: 2 x 1200W Redundant Power Supply			
Keyboard and Mouse			
Microsoft Windows 11 Pro (EN)			
Premium Service-Packet Include (24 month)			
Operating temperature range: 5 to 35°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Depth: 175mm or less			
Width: 180mm or less			
Height: 35mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Weight: 1.5kg or less			
Accessories: Manufacturer standard accessories			
5.2.2 Managed Switch	CISCO	CBS350-48FP-4X-EU	3
Specification			
Type: Layer 3 Switch			
Interface: including 48x Gigabit Ethernet ports , 4x 10G SFP ports, 1x console port			
Throughput: 130mpps or more			
Switching capacity: 170Gbps or more			
Packet buffer: 3MB or more			
IPv4/IPv6 routing: supported			
Hardware stacking: Up to 200 ports managed as a single system with hardware failover or superior			
Port grouping/link aggregation: Support for IEEE 802.3ad Link Aggregation Control Protocol (LACP) up to 8 groups or superior			
Power over Ethernet: 48 PoE ports with 730W total power budget, PoE, PoE+, or superior			
VLAN: Support for up 4,000 VLANs simultaneously or more			
Spanning Tree Protocol: Comply IEEE 802.1d			
RADIUS/TACACS+: Supports RADIUS and TACACS authentication			
Security: DOS attack prevention			
Fan: 1x fixed fan			
Operating temperature range: -5 to 50°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Depth: 345mm or less			
Width: 445mm or less			
Height: 44mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Weight: 6kg or less			
Accessories: Manufacturer standard accessories			
5.2.3 Access Point	Ubiquiti	UAP-NANOHD	1
Specification			
Type: Indoor, dual radio, 5GHz 4x4 MIMO and 2.4GHz 2X2 MIMO			
Supported radio technologies: including 802.11a/b/g/n/ac			
Ethernet port: 10/100/1000BASE-T			
Cabling type: Category 6 or superior			
Security: including WPA2, WPA3			
Wireless throughput:			

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300Mbps on 2.4GHz or better			
1.7Gbps on 5GHz or better			
User support: 200 users/clients per radio			
Wireless frequency: Dual concurrent radios (2.4 and 5GHz)			
Radio and modulation type: including Dual radio, Orthogonal Frequency Division Multiplexing (OFDM)			
Antennas: Internal antennas			
Transmit power: +23dBm or more			
23dBm on 2.4GHz or better			
26dBm on 5GHz or better			
Antenna gain:			
2.5dBi on 2.4GHz or better			
5dBi on 5GHz or better			
Multiple SSIDs: 8 per radio or more			
Operating temperature range: -10 to 70°C or wider			
Operating humidity range (non condensing): 5% to 95% or wider			
Dimensions:			
Depth: 33mm or less			
Width: 160mm or less			
Height: 160mm or less			
Power supply: PoE+			
Weight: 320g or less			
Accessories: Manufacturer standard accessories			
5.2.4 LTE Router	D-Link	DWR-953V2	1
Specification			
Type 4G LTE Router			
Device interface: including followings			
Interfaces: 1 x 10/100/1000 Gigabit Ethernet WAN/LAN port			
3 x 10/100/1000 Gigabit Ethernet LAN ports			
1 x LTE SIM/USIM Slot			
1 x Reset Button			
1 x WPS Button			
1 x Power Port			
Antenna type: 2 x 2 LTE external antenna or similar			
Frequency support:: including followings			
LTE band: FDD:1/3/7/8/20/28 (2100/1800/2600/900/800/700MHz)			
TDD: 38/40 (2600/2300MHz)			
UMTS: 1/8 (2100/900MHz)			
GSM/GPRS: Quad-Bands (850/900/1800/1900MHz)			
Data rates:			
LTE Downlink: 150Mbps or more			
LTE Uplink: 50Mbps or more			
DC-HSPA Downlink: 40Mbps or more			
DC-HSPA Uplink: 5.5Mbps or more			
Wireless standard: including IEEE 802.11 ac/n/g/b			
Wi-Fi Data Rate:			
5GHz: 860Mbps or more			
2.4GHz: 300Mbps or more			
Security Protocol: including WEP, WPA and WPA2			
Firewall: including followings			
NAT			
URL Blocking			
SPI			
MAC Filtering			
Device management; Web UI			
Operating temperature range: 0 to 40°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Depth: 33mm or less			
Width: 160mm or less			
Height: 130mm or less			
Power supply: AC100-240V 50/60Hz (AC Adapter is accepted)			
Weight: 280g or less			
Accessories: Manufacturer standard accessories			
5.3 KVM SYSTEM			
5.3.1 Matrix Switch	IHSE	K480-08C	1
Specification			
Compact KVM matrix switch			
Ports: 8x			
Input / Output: Cat X			
Distance: 140m			
Bandwidth: 1G			
Supported Signals: including followings			
DisplayPort, HDMI, DVI-D, DVI-I, USB 2.0, USB-HID, RS232,			
RS422, analog / digital or balanced audio			
Size, 1 RU (half wide)			
Redundant power supply: AC and DC			
5.3.2 Chassis	IHSE	474-BODY4R	1
Specification			
4-Slot-Chassis for 4 KVM Extender module			

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5.3.3 Rackmount hardware	IHSE	474-4RMK	1
Specification			
19" rack mount kit (1 RU, for 4 bay chassis) for 1 Draco CWDM device (18CH)			
5.3.4 Power Supply Unit	IHSE	474-PSU4	1
Specification			
Spare ext. PSU for 4-slot chassis			
5.3.5 Module	IHSE	L481-BHHC	3
Specification			
KVM Extender CPU module			
HDMI SL 1920 x 1200 at 60Hz, USB HID, Cat X: 140m max.			
5.3.6 Module	IHSE	L483-B2HC	1
Specification			
KVM Extender CPU module			
DisplayPort 1.1 Dual Head 1920 x 1200 at 60Hz, USB HID, Cat X: 140m max.			
5.3.7 Chassis	IHSE	474-BODY2BPF	3
Specification			
Chassis for 2 modules, integrated backplane power supply, setup for redundant power supply (lockable)			
5.3.8 Rackmount Hardware	IHSE	474-2RMK	3
Specification			
19" rack mount kit (1 RU, for 2 bay chassis) for 1 Draco CWDM device (4/8CH)			
5.3.9 Power Supply Unit	IHSE	474-PSU2BPF	1
Specification			
Spare ext. PSU for 2-slot chassis with backplane, lockable connector			
5.3.10 Module	IHSE	R481-BHHC	2
Specification			
KVM Extender CON module			
HDMI SL 1920 x 1200 at 60Hz, USB HID, Cat X: 140m max.			
5.3.11 Module	IHSE	R483-B2HC	1
Specification			
KVM Extender CON module			
DisplayPort 1.1 Dual Head 1920 x 1200 at 60Hz, USB HID, Cat X: 140m max.			
5.3.12 Module	IHSE	R474-BAH	3
Specification			
KVM Extender CON add-on module			
USB HID, RS232, Analog Audio bi-di			
6 CABLE AND ACCESSORIES			
6.1 EXTERNAL PANEL			
6.1.1 Panel	Broadcast Solutions	1ru16xlr	5
Specification			
Type: 1U, 19" rack mounting, audio panel			
Number of port: 16			
Connector: XLR F or M			
6.1.2 Panel	Broadcast Solutions	1ru20bnc	4
Specification			
Type: 1U, 19" rack mounting, BNC panel			
Number of port: 20			
Connector: BNC			
6.1.3 Panel	Broadcast Solutions	1ru16xlr	1
Specification			
Type: 1U, 19" rack mounting, GPI panel			
Number of port: 16			
Connector: XLR F or M			
6.1.4 Panel	Broadcast Solutions	1ru1x24rj45	1
Specification			
Type: 1U, 19" rack mounting, UTP panel			
Number of port: 24			
Connector: RJ45			
6.1.5 Panel	Broadcast Solutions	1ru4xD-LC	1
Specification			
Type: 1U, 19" rack mounting, fiber panel			
Number of port: 4			
Connector: Protected duplex LC			
6.2 PATCH PANEL			
6.2.1 Patch Bay	CANARE	32MCK-ST	8
12G-SDI Staggered Video Patchbay, Normal Thru, Blk			
6.2.2 Patch Cord	CANARE	MVPC005	30

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Specification			
Type: Both-end connectorized video patch cord			
Jacket color: Black			
Length: 0.5m			
Connector: MVP-C4			
6.2.3 Patch Cord	CANARE	MVPC01	10
Specification			
Type: Both-end connectorized video patch cord			
Jacket color: Black			
Length: 1m			
Connector: MVP-C4			
6.2.4 Patch Panel	Ghielmetti	CSF 1x48 AV 3/1	3
Specification			
Type: 1U, 19" rack mounting, CSF AV patch panel			
Number of port: 48			
Connector: 3-pole			
6.2.5 Patch Cord	Ghielmetti	GMK313/60	20
Specification			
Type: Both-end connectorized AES/EBU digital and analogue audio patch cord			
Jacket color: Black			
Length: 0.6m			
6.2.6 Patch Cord	Ghielmetti	GMK 313/ 30	20
Specification			
Type: Both-end connectorized AES/EBU digital and analogue audio patch cord			
Jacket color: Black			
Length: 0.3m			
6.2.7 Patch Panel	Broadcast Solutions	1ru1x24rj45	2
Specification			
Type: 1U, 19" rack mounting, UTP patch panel			
Number of port: 24			
Connector: RJ45			
6.2.8 Patch Cord	EFB	K8051.0,50	10
Specification			
Type: Both-end connectorized CAT6 patch cord			
Cable type: S/FTP CAT6 cable			
Jacket color: Green			
Length: 0.5m			
Assembled with RJ45 CAT6 TM21 connector or similar			
Pin assignment: Straight through			
6.2.9 Patch Cord	EFB	K8050.1	5
Specification			
Type: Both-end connectorized CAT6 patch cord			
Cable type: S/FTP CAT6 cable			
Jacket color: White			
Length: 1m			
Assembled with RJ45 CAT6 TM21 connector or similar			
Pin assignment: Straight through			
6.3 CABLE SET			
6.3.1 Fiber Cable	Broadcast Solutions	custom build	8
200 mtr SMPTE 311 with FUW and PUW connectors, coiled to ring			
6.3.2 Fiber Cable	Broadcast Solutions	custom build	4
50 mtr SMPTE 311 with FUW and PUW connectors, coiled on cable drum GT 310 RM			
6.3.3 Microphone Cable	Broadcast Solutions	custom build	8
Specification			
Type: Both-end connectorized microphone cable coiled on cable drum			
Cable type: 2 x 0.22mm ² shielded microphone cable			
Jacket color: Black			
Length: 100m			
Assembled with XLR 3pol connector male and female			
Drum type: IT 266 RM or similar			
6.3.4 Microphone Cable	Broadcast Solutions	custom build	8
Specification			
Type: Both-end connectorized microphone cable coiled on cable drum			
Cable type: 2 x 0.22mm ² shielded microphone cable			
Jacket color: Black			
Length: 50m			
Assembled with XLR 3pol connector male and female			
Drum type: IT 266 RM or similar			
6.3.5 Cable Protector	Adam Hall GmbH	85200	10
Specification			

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Type: 3 Channels			
Width: approx. 290 mm			
Height: approx.50 mm			
Length: approx. 1005 mm			
Material: Polyurethane			
Max load: approx. 2 ton a surface area of 20 x 20 cm			
Chemical resistance: Chemical resistance			
7 SPARE PARTS			
7.1 Workstation	RIEDEL	NUC	1
Specification			
Spare equipment/ Apparatus of 3.3.7 Client Workstation			
7.2 Spare Monitor	IYYAMA	T2435MSC-B2	1
Specification			
Spare equipment/ Apparatus of 3.10.1.3 Monitor			
7.3 PSU	RIEDEL	SP-PSU-SL	1
Specification			
Spare PSU for 3.3.1 Replay server 4RU			
7.4 Spare HDD	RIEDEL	SP-HDD-SL	1
Specification			
Spare HDD for 3.3.1 Replay server 4RU			
7.5 Spare PSU	ClassX	SP-PSU-CLSX	1
Specification			
Spare PSU for 3.6.1 Graphic System 4RU			
7.6 Spare HDD	ClassX	SP-HDD-CLSX	1
Specification			
Spare HDD for 3.6.1 Graphic System 4RU			
7.7 Spare Switch	CISCO	CBS350-48FP-4X-EU	1
Specification			
Spare switch for 5.2.2 Managed Switch			

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Technical Specifications	Reference brand		Quantity
	Manufacturer	Model	
1 6-CAMERAS OB-VAN(6カメラ搭載中継車)			
1.1 VAN PLATFORM			
Commercial vehicle	Mercedes-Benz	Sprinter 517CDI long	1
Gross vehicle weight: 7,2 tons or more			
Displacement: 3,0L or more			
Diesel Engine			
Engine maximum output: 129 kW/176 HP or more			
6-speed or more manual transmission			
Wheelbase : approx. 4.100 mm			
High roof (H2) air-conditioner DAB Radio with Bluetooth handsfree trailer hitch			
White color			
Steering : left hand drive			
1.2 COACH BUILDING VAN			
1.2.1 COACH BUILDING GENERAL OUTSIDE			
1.2.1.1 Levelling system	Broadcast Solutions	HYD LEVEL 2T	1
2-Point hydraulic level system		for MB Sprinter	
2 ton per jack			
Touch panel control			
Auto-leveling system			
1.2.1.2 Ladder	Broadcast Solutions	custom made	1
2m aluminum (Ø= 22mm) railing for ladder roof access, mounted at the left rear roof side			
1.2.1.3 Storage box	Broadcast Solutions	custom made	1
Middle size cable entry box, AL 3mm			
1.2.1.4 Cover	Hindermann	Classic	1
Thermo-window-mats			
High-end 10mm polyester isolation material or similar			
1.2.2 INTERIOR FURNITURE AND COATING			
1.2.2.1 Interior	Broadcast Solutions	custom built	1
Worktable Production			
1.2.2.2 Interior	Broadcast Solutions	custom built	1
Central racks 2x 20 RU and 2x 12RU			
1.2.2.3 Interior	Broadcast Solutions	custom built	1
Air channeling doors for central racks from the rear section			
1.2.2.4 Interior	Broadcast Solutions	custom built	1
Screen mount			
1.2.2.5 Interior	Broadcast Solutions	custom built	1
Coating walls, floor and ceiling			
1.2.2.6 Interior	Broadcast Solutions	custom built	1
Antistatic floor coating (lightweight 2mm thickness)			
1.2.2.7 Interior	Broadcast Solutions	custom built	1
Velour carpet at the walls			
1.2.2.8 Interior	Broadcast Solutions	custom built	1
Silver colored perforated aluminium panels at the ceiling air handling type			
1.2.2.9 Interior	Broadcast Solutions	custom built	1
4x standard office chair			
1.2.2.10 Interior	Broadcast Solutions	custom built	1
Rear area			
1.2.2.11 Interior	Broadcast Solutions	custom built	1
External patch panel 16RU			
1.2.2.12 INTERIOR FURNITURE AND COATING			
1.2.2.12.1 Interior	Broadcast Solutions	custom built	1
PRODUCTION DESK FOR 5 WORK PLACES			
1.2.2.12.2 Interior	Broadcast Solutions	custom built	1
RACKS			
Central racks 2x 20 RU and 2x 12RU			
1.2.2.12.4 Interior	Broadcast Solutions	custom built	1
MOUNT FOR SCREENS			
1.2.2.12.5 Interior	Broadcast Solutions	custom built	1
COATING WALLS, FLOOR AND CELLING			
Antistatic floor coating (lightweight 2mm thickness)			
Velour carpet at the walls			
Silver colored perforated aluminium panels at the ceiling air handling type			
1.2.2.12.6 Design cost	Broadcast Solutions	project specific	1
SERVICES			
1.2.2.12.7 Interior	Broadcast Solutions	custom built	1
Rear Storage and external patch panel 16RU			
1.3 POWER SYSTEM			
1.3.1 Power system Van			
1.3.1.1 Power system	Broadcast Solutions	custom built	1
Suitable power system contains the following main features:			
1.3.1.2 External power plug	Broadcast Solutions	custom built	1
2 Inputs CEE 32A plug with cable drum and connection cable			
1.3.1.3 Distribution board	Broadcast Solutions	custom built	1
Build in distribution panel with all needed ground fault- and circuit breakers, digital measurement, switches and clamps			
1.3.1.4 Interior lighting	Broadcast Solutions	custom built	1
Lighting in all areas as:			
General LED lights			
LED build in spot light at the workplaces			
LED rigging light left-, right- and rear side			
LED light outside patch panel			
LED light storage area			
1.3.1.5 UPS	Eaton	5P1550IR	3
1550VA/1100W Rack 1U USB RS232 and relay contact 4min or more Runtime 1100W			
Secondary frequency - max 60 Hz			
Output waveform - Sine wave			
Wattage - 1100 W or more			
Output power factor - 0.7 or more			
Form factor - Rack			
Input connection - C14			
Input voltage - min - 150 V			
Output voltage - max - 240 V			
Secondary frequency - min - 50 Hz			
Battery replacement - User replaceable			

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Technical Specifications	Reference brand		Quantity
Battery type - Lead-acid maintenance-free (replaceable)			
Efficiency - 97 or more			
Special features:			
Automatic Voltage Regulation (AVR)			
High-density protection for networks: 1U only			
Energy efficient - reduce energy and cooling costs			
Delivers clean sinewave output			
1 slot for optional com card (Network management card Relay card or Network and Industrial card)			
Compatible with Virtual environments (VMware Hyper-V Citrix Xen Redhat)			
1 USB port + 1 serial port			
Advanced Battery Management (ABM) technology to increase battery lifetime			
Next-generation graphical LCD display			
Hot swappable batteries			
Remote reboot and runtime optimization thanks to 2 manageable outlet groups			
Construction type - 482.6 mm device or less			
Output voltage - min - 200 V			
Output voltage range - 230 V (+6%/-10%)			
Topology - Line-interactive			
BTU Rating - Online: 225			
Runtime at half load - 13 min or more			
Input nominal voltage - 230V default (200/208/220/230/240V)			
Input frequency range - 47-70 Hz (50 Hz system) 56.5-70 Hz (60 Hz system) 40 Hz in low sensitivity mode			
Input voltage - max - 294 V			
Voltage type - AC			
Phase (output) - 1			
Battery management - ABM or constant voltage charging method (user selectable) automatic battery test deep discharge protection			
Auto shutdown function - Yes			
Number of Outputs C13 - 6			
VA rating - 1550 VA			
Potential free switch contact - Yes			
Receptacle - (6) C13			
Phase (input) - 1			
1.3.1.6 POWER SYSTEM VAN ROLLUP			
1.3.1.6.1 Cable	Broadcast Solutions	custom built	1
POWER INPUT / CABLE DRUM			
2 Inputs CEE 32A plug with cable drum and connection cable			
1.3.1.6.2 Display	Broadcast Solutions	custom built	1
DISTRIBUTION PANEL			
Build in distribution panel with all needed ground fault- and circuit breakers, digital measurement, switches and clamps			
1.3.1.6.3 Lighting	Broadcast Solutions	custom built	1
LIGHT			
Lighting in all areas as:			
General LED lights			
LED build in spot light at the workplaces			
LED rigging light left- right- and rear side			
LED light outside patch panel			
LED light storage area			
1.3.1.6.4 UPS	Broadcast Solutions	custom built	1
3x UPS 1550VA/1100W Rack 1U USB RS232 and relay contact 4min or more Runtime 1100W			
1.3.2 Smoke alarm			
1.3.2.1 Smoke alarm	Broadcast Solutions	custom built	1
Battery powered smoke alarm without power station			
1.3.3 On-air light			
1.3.3.1 On-air light	Broadcast Solutions	DL133 WW 3021	1
LED powered on-air light, visible in letters, switchable from green to red			
1.4 AIR CONDITIONER			
1.4.1 Production room			
1.4.1.1 Air conditioner	Broadcast Solutions	custom built	1
Cooling Capacity: 3,95 KW (13500 BTU) or more - Average amps: 7,2 - Cools a volume up to 50 cm. Ideal for the			
Conditioning of big vehicles in hot areas. Air flow of 509 cm / hour at high speed, 1.5kW heater assembly			
1.4.1.2 Piping	Broadcast Solutions	custom built	1
Air distribution, and ceiling mounting			
1.4.1.3 Installation and adjustment	Broadcast Solutions	custom built	1
Tubing, adjustment and testing of the system			
1.4.2 Central rack unit			
1.4.2.1 Air conditioner	Broadcast Solutions	custom built	1
Cooling Capacity: 3,95 KW (13500 BTU) or more - Average amps: 7,2 - Cools a volume up to 50 cm. Ideal for the			
Conditioning of big vehicles in hot areas. Air flow of 509 cm / hour at high speed, 1.5kW heater assembly			
1.4.2.2 Piping	Broadcast Solutions	custom built	1
Air distribution, and ceiling mounting			
1.4.2.3 Installation and adjustment	Broadcast Solutions	custom built	1
Tubing, adjustment and testing of the system			
1.4.3 Pre-heating system			
1.4.3.1 Pre-heater	Webasto	Airtop 2000 STC 24V D	1
Diesel air pre heater 2kW with controller and installation.			
Heat output (kW) (BTU/h) 0.9 – 2.0			
Heat output (BTU/h) 3,000 - 7,000			
Fuel Diesel			
Fuel consumption (l/h) 0.12 – 0.24 or less			
Rated voltage (V) 24			
Rated power consumption (W) 14-29 or less			
Dimension L x W x H (mm) 310 x 120 x 118 or less			
Net weight (kg) 2,6 or less			
1.4.3.2 Mounting material	Broadcast Solutions	custom built	1
Mounting material with adaption to the vehicle fuel tank.			
2 CAMERA			
2.1 CAMERA HEADS / TRANSMISSION			
2.1.1 2/3-inch 4K 3CMOS System Camera	SONY	HDC-3200	6

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Technical Specifications	Reference brand		Quantity
<p>Camera 2/3-inch type 4K CMOS sensor with global shutter, 3-CMOS, RGB, Effective resolution (H x V) QFHD: 3840 x 2160 HD: 1920 x 1080 Sensitivity F10 with 1080/59.94p F11 with 1080/50p (at 2,000 lx with 89.9% reflectance) Noise level -62 dB Horizontal resolution 2,000 TV lines (at center of screen) 1,000 TV lines (at center of screen) Geometric distortion Negligible (not including lens distortion) Spectrum system F1.4 prism Built-in filters ND filters 1: CLEAR, 2: 1/4ND, 3: 1/16ND, 4: 1/64ND, 5: Cross filter CC filters B: 3200K, C: 4300K, D: 6300K</p> <p>Video Modes 1080/59.94i, 1080/23.98PsF 1080/24PsF, 1080/29.97PsF 1080/59.94p 720/59.94p, 1080/119.88i 720/119.88p, UHD/59.94p</p> <p>Input/output connectors CCU: Optical/electrical multi connector LENS: 12-pin (x1) VF: 20-pin (x1) MIC 1 IN: XLR 3-pin, female (x1) AUDIO IN CH1, CH2: XLR 3-pin, female (x1 each) When AUDIO switch is set to MIC: -60 dBu (can be selected up to -20 dBu by menu operation), balanced When AUDIO switch is set to LINE: 0 dBu, balanced INTERCOM 1: XLR 5-pin, female (x1) INTERCOM 2: No DC IN: XLR 4-pin (x1), DC 10.5 to 17 V DC OUT: 4-pin (x1), DC 10.5 to 17 V, max. 0.5 A 2-pin (x1), DC 10.5 to 17 V, Max. 2.5 A SDI 1: BNC (x1) SDI MONI: BNC (x1) TEST OUT: BNC (x1) PROMPTER/GENLOCK: BNC (x1) PROMPTER 1 Vp-p, 75 Ω GENLOCK HD: SMPTE ST274, tri-level sync, 0.6 Vp-p, 75 Ω, SD: Black burst (NTSC: 0.286 Vp-p, 75 Ω/PAL: 0.3 Vp-p, 75 Ω)</p> <p>General Power requirements AC 240 V, 1.4 A (max.), DC 12 V, 9.5 A (max.), DC 240 V, 1.05 A (max.) DC 240 V, 1.05 A (max.) Operating temperature -20°C to +45°C Storage temperature -20°C to +60°C Mass Approx. 4.6 kg (Unit only)</p>			
2.1.2 Camera Control Unit	SONY	HDCU-3500//U	6
<p>Input/output connectors CAMERA: FIBER Optical fiber connector INTERCOM/TALLY/IO PORT: D-sub 50-pin connector (x1), INTERCOM (PROD/ENG), 4 W: 0 dBu, RTS: 0 dBu, CC: -14 dBu, PGM, 3 systems, 0dBu/-20dBu, TALLY (R, G, Y), FLAG RCP/CNU: 8-pin multi-connector (x1) TRUNK: 12-pin (x1) LAN-COM: 8-pin (x1) NETWORK TRUNK: 8-pin (x1) SDI I/O 1 to 4 3G/HD/SD-SDI I/O, BNC (x4), 3G-SDI: SMPTE ST424/425 Level-A/B, 0.8 Vp-p, 75 Ω, 2.970 Gbps/2.967 Gbps, HD-SDI: SMPTE ST292, 0.8 Vp-p, 75 Ω, 1.485 Gbps/1.4835 Gbps SD-SDI: SMPTE ST259, 0.8 Vp-p, 75 Ω, 270Mbps, 3G-SDI/HD-SDI/SD-SDI, character signal selectable REFERENCE IN/OUT BNC (x2), loop-through output, HD: SMPTE ST274, tri-level sync, 0.6 Vp-p, 75 Ω, SD: Black burst (NTSC: 0.286 Vp-p, 75 Ω/PAL: 0.3 Vp-p, 75 Ω) or NTSC 10F-BB</p> <p>Input connectors AC IN: AC 100 V to 240 V (x1) SDI RET 1 to 4: BNC (x4), 3G-SDI: SMPTE ST424/425, 2.970 Gbps/2.967 Gbps, HD-SDI: SMPTE ST292, 1.485 Gbps/1.4835 Gbps, SD-SDI: SMPTE ST259, 270 Mbps PROMPTER 1 PROMPTER 2/VBS-RET BNC: (x2), loop-through output during 1CH mode, terminate internally at 75 Ω during 2CH mode, analog signal, 1.0 Vp-p, 75 Ω</p> <p>Output connectors AUDIO OUT CH1, CH2: XLR 3-pin, male (x2), 0dBu/-20 dBu/+4 dBu CHARACTER/ABS/EBU: BNC (x1), VBS, 1 Vp-p, 75 Ω AES/EBU format VBS/HD and AES/EBU selectable SDI OUT 1 to 4: 3G/HD/SD SDI OUTPUT, BNC (x4), 3G-SDI: SMPTE ST424/425 Level-A/B, 0.8 Vp-p, 75 Ω, 2.970 Gbps/2.967 Gbps, HD-SDI: SMPTE ST292, 0.8 Vp-p, 75 Ω, 1.485 Gbps/1.4835 Gbps SD-SDI: SMPTE ST259, 0.8 Vp-p, 75 Ω, 270 Mbps, 3G-SDI/HD-SDI/SD-SDI, character signal selectable UHD SDI A, B, C, D: 12G/3G/HD SDI OUTPUT, BNC (x2) 12G SDI: SMPTE ST2082, 0.8 Vp-p, 75 Ω, 11.88 Gbps/11.868 Gbps * 12G SDI can be selected by installing the HZCU-UHD35. 3G SDI: SMPTE ST424/425 Level-A/B, 0.8 Vp-p, 75 Ω, 2.970 Gbps/ 2.967 Gbps HD SDI: SMPTE ST292, 0.8 Vp-p, 75 Ω, 1.485 Gbps/1.4835 Gbps</p> <p>General Power requirements 100 V to 240 V AC, 50/60 Hz Current consumption 4.5 A (max.) Operating temperature -10 °C to +40 °C Storage temperature -20 °C to +60 °C Mass Approx. 6.3 kg</p>			
2.2 VIEWFINDER			
2.2.1 OLED 0.7-inch colour HD viewfinder	SONY	HDVF-EL20//U	2

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Technical Specifications	Reference brand		Quantity
Display Type 0.7" (1.8 cm) Color OLED Display Area (HxV) 5 x 1.0 cm 16:9 Aspect ratio Diopter Range For Loupe: -4.0 to +2.0 m-1 Brightness 200 cd/m ² (Typical) Effective Pixels 1920 (H) x 1080 (V) x 3 (RGB) Color Temperature D65 Digital Scanning Frequency (H / V) 1080 Scanning Lines: 23.98PsF: 26.97 kHz / 47.95 Hz 24PsF: 27.00 kHz / 48 Hz 25PsF: 28.13 kHz / 50 Hz 29.97PsF: 33.72 kHz / 59.94 Hz 50i: 28.13 kHz / 50 Hz 59.94i: 33.72 kHz / 59.94 Hz 720 Scanning Lines: 50P: 36.00 kHz / 50 Hz 59.94P: 44.96 kHz / 59.94 Hz Input Signals Y: 1.0 Vpp, Synchronous, 75 Ohm terminated Pb, Pr: 0.7 Vpp, Asynchronous, 75 Ohm terminated Camera Connector Round type 20-pin Power Supply 10.5 to 17.0 VDC (Supplied by the camera) Power Consumption 6.9 W Temperature Storage: -20 to 60°C Operating: -20 to 45°C Dimensions (Folded) 20.7 x 21.2 x 8.0 cm Weight 0.8 kg			
2.2.2 Full HD 7.4-inch OLED viewfinder	SONY	HDVF-EL740	5
Display Type Color OLED Diagonal Screen Size 7.4" (18.8 cm) Effective Picture Size (H x V) (16.4 x 9.2 cm) Effective Pixels 960 x 540 x 3 (RGB) Brightness 350 cd/m ² TV Lines 500 or more Color Temperature Approx. 6500K daylight (D65) Camera Connector D-sub 25-pin x1 Supported Formats 1080-line: 23.98PsF, 24PsF, 25PsF, 29.97PsF, 30PsF, 50i, 59.94i, 60i 720-line: 50p, 59.74p, 60p Power Requirement 10.5-17.0 V DC Power Consumption 19.5 W Operating Temperature -20 to +45°C Dimensions (WxHxD) 30.8 x 22.3 x 28.9 cm Weight: 3.8 kg			
2.2.3 Sports Hood for HDVF-EL70/75	SONY	VFH-790	5
2.3 CAMERA OPERATION CONTROL			
2.3.1 Camera Control Panel Joystick type of remote camera control panel General Power Supply: DC 10.5 to 30 V, PoE (IEEE802.3af Class2) Power Consumption: 4 W Operation Temperature 5 to 40°C Dimensions (W x H x D): (excluding protrusions) 80 x 310 x 125 mm Mass: 1.4 kg Input/output connectors LAN: RJ-45 8pin (x1) 10BASE-T, 100BASE-TX, 1000BASE-T CCU/CNU: Multi-connector 8pin, female (x1) EXT I/O: D-Sub 9-pin, female (x1)	SONY	RCP-3100/U	6
2.4 ACCESSORIES			
2.4.1 Tripod Adaptor For Port. Cameras/Camc.	SONY	VCT-14	6
Specification			
Use: to mount the corner on the proposed tripod			
Function: Quick attach and release mechanism			
2.4.2 Shot Gun Microphone	RODE	NTG1	2
Specification			
Type: Condenser microphone			
Directional pattern: Super-cardioid			
Frequency range : 20 to 20,000Hz or wider			
Sensitivity : -36dB ±2dB re 1V/Pa @ 1kHz or better			
Nominal impedance : 50Ω			
Equivalent noise : 18dBA SPL (A-weighted per IEC651) or better			
Maximum output: +6.9dBu (@ 1% THD into 1kΩ) or more			
Dynamic range: 121dB (per IEC651) or more			
Maximum SPL: 139dB (@ 1kHz, 1% THD into 1kΩ load)			
Signal/Noise: 76dB SPL (A-weighted per IEC651)			
Dimensions:			
Length: 220mm or similar			
Diameter: 22mm or similar			
output connection: 3-pin XLR			
Weight : 105g or less			
Power requirement: 48V Phantom Power			
Accessories: Manufacturer standard accessories			
2.4.3 Windscreen	RODE	WS6	2
Specification			
Use : for shotgun microphones			
Maximum microphone length of slot: 160mm or similar			
Maximum microphone diameter: 21 to 22.5mm			
2.4.4 Fibre Cable	Broadcast Solutions	CUSTOM	6
Specification			
Type: Both-end connectorized fibre cable			
Fibre cable type: to be proposed			
Length: 3 m			

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Technical Specifications	Reference brand		Quantity
Connector type: to be proposed			
2.4.5 Flight Case for Camera Head and Accessories	Broadcast Solutions	CUSTOM	6
Specification			
Use: for transportation of Camera head and accessories			
Durability : shall be strong enough in harsh environment			
Size/shape/composition: to be proposed			
2.4.6 Rain Cover	Broadcast Solutions	CUSTOM	6
Specification			
Use: to protect the camera from heavy rain			
Size/shape/material: to be proposed			
2.4.7 Winter Cover	Broadcast Solutions	CUSTOM	6
Specification			
Use: to protect the camera from cold environment			
Size/shape/material: to be proposed			
2.4.8 Headset	Beyerdynamic	DT 290 MK II	6
Specification			
Headphone			
Type: Headset double muff type with cable			
Frequency range: 10 to 30kHz or wider			
Nominal impedance: 200/80 Ω			
Nominal SPL at 1kHz: 100dB SPL at 1 mW or better			
T.H.D: 0.2% or less			
Nominal power rating: 100 mW or similar			
Weight without cable: 240g or less			
Microphone			
Type: Dynamic microphone			
Frequency response: 40 to 12kHz or wider			
Polar pattern: Hypercardioid			
Output voltage at a distance of 5 cm: approx. 1.5V/Pa			
Nominal impedance: 200 Ω			
Outer diameter: approx. 23mm			
Accessories: Manufacturer standard accessories			
2.4.9 Headset	Beyerdynamic	DT 280 MK II	2
Specification			
Headphone			
Type: Headset single muff type with cable			
Frequency range: 10 to 30kHz or wider			
Nominal impedance: 200/80 Ω			
Nominal SPL at 1kHz: 100dB SPL at 1 mW or better			
T.H.D: 0.2% or less			
Nominal power rating: 100 mW or similar			
Weight without cable: 240g or less			
Microphone			
Type: Dynamic microphone			
Frequency response: 40 to 12kHz or wider			
Polar pattern: Hypercardioid			
Output voltage at a distance of 5 cm: approx. 1.3 mV/Pa			
Nominal impedance: 200 Ω			
Outer diameter: approx. 23mm			
Accessories: Manufacturer standard accessories			
2.5 CABLES ON PORTABLE DRUM			
2.5.1 Fibre Cable	Broadcast Solutions	CUSTOM	6
Specification			
Type: Both-end connectorized fibre cable coiled on cable drum			
Fibre cable type: to be proposed			
Length: 150 m			
Connector type: to be proposed			
2.6 TRIPOD			
2.6.1 Tripod System	CARTONI	KSDS18-A	6
Specification			
Type: 2 stages aluminum tripod			
Head: Fluid head with 1 handle			
Maximum height: 163 cm or more			
Minimum height: 78 cm or less			
Capacity: 18kg or more			
Weight: 8kg or less			
Spreader: Smart lock mid-level			
2.6.2 Telescopic Pan Bar	CARTONI	AH841	6
Specification			
Type: Aluminum telescopic pan bar compile to the 2.6.1 Tripod			
2.7 LENS			
2.7.1 4K ENG/EFP Lens	FUJINON	UA23x7.6BERD-S10	4
Specification			
Application: 2/3" Format Color Camera			
Focal length: 7.6 to 175mm			
Zoom ratio: 23 x			
Maximum relative aperture: F1.8 (7.6 to 119mm) to F2.65 (175mm)			
Iris range: F1.8 to F16, Closed			
Image Format (H x V): 9.59 x 5.39mm (φ 11.0mm) Aspect Ratio 16 : 9			
Flange Focal Length (IN AIR): 48mm (Adjustable Range: ± 0.2mm)			
Minimum Object Distance (from front of Lens): 0.8 m (0.04 m in Macro Operation)			
Field Angle (H x V) WIDE: 64.5°x 39.0°			
Field Angle (H x V) TELE: 3.1°x 1.8°			
Full Length: 222mm or less			
Digital drive unit: including followings			
Accurate and swift zooming and focusing			
Ultra-slow and smooth zooming and focusing			
Outputting zoom, focus and iris position at 16-bit			
Automatic compensation of focus breathing			
Mount: Bayonet Mount			
Mass (without Lens Hood, Approx.): 2kg or less			

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Technical Specifications	Reference brand	Quantity	
Accessories: Manufacturer standard accessories			
2.7.2 Protection Filter for ENG/EFP Lenses	FUJINON	EPF-107	4
Specification			
Use: to protect 2.7.1 4K ENG/EFP Lens			
2.7.3 Zoom + Focus Control Complete Kit	FUJINON	SS-15D-02 Servo Kit	4
Specification			
Type: Digital servo control kit for 2.7.1 4K ENG/EFP Lens			
Composition: including followings			
Digital zoom demand with mounting clump			
Digital focus demand with mounting clump			
Connection cables			
Accessories: Manufacturer standard accessories			
2.7.4 4K ENG/EFP Lens	FUJINON	UA14x4.5BERD-S10B	2
Specification			
Application: 2/3" Format Color Camera			
Focal length: 4.5 to 63mm			
Zoom ratio: 14 x			
Maximum relative aperture: F1.8 (4.5 to 41mm) to F2.8 (63mm)			
Iris range: F1.8 to F16, Closed			
Image Format (H x V): 9.59 x 5.39mm (φ 11.0mm) Aspect Ratio 16 : 9			
Flange Focal Length (IN AIR): 48mm (Adjustable Range: ± 0.2mm)			
Minimum Object Distance (from front of Lens): 0.3 m (0.05 m in Macro Operation)			
Field Angle (H x V) WIDE: 93.6°x 61.8°			
Field Angle (H x V) TELE: 8.7°x 4.9°			
Full Length: 239mm or less			
Digital drive unit: including followings			
Accurate and swift zooming and focusing			
Ultra-slow and smooth zooming and focusing			
Outputting zoom, focus and iris position at 16-bit			
Automatic compensation of focus breathing			
Mount: Bayonet Mount			
Mass (without Lens Hood, Approx.): 2.3kg or less			
Accessories: Manufacturer standard accessories			
2.7.5 Protection Filter for ENG/EFP Lenses	FUJINON	EPF-127	2
Specification			
Use: to protect 2.7.4 4K ENG/EFP Lens			
2.7.6 Zoom + Focus Control Complete Kit	FUJINON	SS-15D-02 Servo Kit	2
Specification			
Type: Digital servo control kit for 2.7.4 4K ENG/EFP Lens			
Composition: including followings			
Digital zoom demand with mounting clump			
Digital focus demand with mounting clump			
Connection cables			
Accessories: Manufacturer standard accessories			
3 VIDEO			
3.1 ROUTER AND MULTIVIEWER			
3.1.1.1 Multiformat Video Router 1RU Frame	ROSS	ULTRIX-NS-FR1	1
Specification			
Video matrix size: 16x16 or more			
Embedded audio: 256x256 or more			
Input specification: including followings			
Standard input: HD BNC			
Signal type: SDI 270 Mb/s, 1.5 Gb/s, 3.0 Gb/s			
Impedance: 75Ω			
Max input level: 800mV			
Return loss: Per SMPTE 2082-1			
Typical equalization: UHD 60m, 3G 180m, HD 200m, SD 400m			
SFP aux port: 2x			
Output specification: including followings			
Standard output: HD BNC			
Signal type: SDI 270 Mb/s, 1.5 Gb/s, 3.0 Gb/s			
Impedance: 75Ω			
Amplitude: 800mV +/- 10%			
Rise & fall time: 270Mb/s: 400-800ps, 1.5 & 3Gb/s: <135ps			
DC offset: 0.0V +/- 10%			
Overshoot: < 10%			
Jitter: <0.2 UI Alignment (up to 3G), <2UI Timing (up to 270M), <1UI Timing (1.5G), <2UI Timing (3G)			
Return loss: Per SMPTE 2082-1			
SFP aux port: 2x			
Embedded Audio Specifications			
Audio channels per I/O: 16			
Physical			
Dimensions:			
Width: 445mm or less			
Depth: 200mm or less			
Height: 44.5mm or less			
Frame weight (approx.): 4.1kg			
3.1.1.2 Rackmount 1RU Power Supply	ROSS	ULTRIPower	1
Specification			
Inputs: 90 to 240VAC or wider			
Positive output: 15VDC			
Maximum total output: 1200W or more			
On-board cooling: Controlled fans			
Physical			
Dimensions:			
Width: 445mm or less			
Depth: 210mm or less			
Height: 44.5mm or less			
Weight (approx.): 3.3kg			
3.1.1.3 Additional Power Supply	ROSS	ULTRIPower-PS	1
Specification			

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Technical Specifications	Reference brand	Quantity	
Inputs: 90 to 240VAC or wider			
Positive output: 15VDC			
Maximum total output: 1200W or more			
On-board cooling: Controlled fans			
Dimensions:			
Width: 445mm or less			
Depth: 210mm or less			
Height: 45mm or less			
Weight (approx.): 3.3kg			
3.1.1.4 Additional I/O Board	ROSS	ULTRIX-HDX-IO	1
Specification			
Video matrix size: 16x16 or more			
Embedded audio: 256x256 or more			
Input specification: including followings			
Standard input: HD BNC			
Signal type: SDI 270 Mb/s, 1.5 Gb/s, 3.0 Gb/s			
Impedance: 75Ω			
Max input level: 800mV			
Return loss: Per SMPTE 2082-1			
Typical equalization: UHD 60m, 3G 180m, HD 200m, SD 400m			
SFP aux port: 2x			
Output specification: including followings			
Standard output: HD BNC			
Signal type: SDI 270 Mb/s, 1.5 Gb/s, 3.0 Gb/s			
Impedance: 75Ω			
Amplitude: 800mV +/- 10%			
Rise & fall time: 270Mb/s: 400-800ps, 1.5 & 3Gb/s: <135ps			
DC offset: 0.0V +/- 10%			
Overshoot: < 10%			
Jitter: <0.2 UI Alignment (up to 3G), <2UI Timing (up to 270M), <1UI Timing (1.5G), <2UI Timing (3G)			
Return loss: Per SMPTE 2082-1			
SFP aux port: 2x			
Embedded Audio Specifications			
Audio channels per I/O: 16			
3.1.1.5 3G SDI HD-BNC Transceiver SFP	ROSS	SFP-HDB-IO-3G	3
Specification			
SMPTE 424M, SMPTE 292M, and SMPTE 259M compliant			
HD-BNC 75Ω connectors			
Equalizes 400m at 270 Mbps			
Supports DVB-ASI at 270Mbps			
Supports video pathological patterns for SD-SDI, HD-SDI, and 3G-SDI			
Hot-pluggable			
3.1.1.6 Fiber 1300nm Multi Mode Transceiver SFP	ROSS	SFP-MADI-1300MM	1
Specification			
Industry SFP package			
LC duplex connector interface			
Suitable for AES10 transmission and receiving			
Operates with 50/125μm and 60/125μm multi-mode fiber			
Hot-pluggable			
3.1.1.7 SRC and Audio Delay on MADI License	ROSS	ULTRISRC	1
Specification			
Necessary licenses shall be provided.			
3.1.1.8 Input Frame sync License	ROSS	ULTRISYNC	4
Specification			
Necessary licenses shall be provided.			
3.1.1.9 Output Multiviewer License	ROSS	ULTRISCAPE	1
Specification			
Necessary licenses shall be provided.			
3.1.1.10 18 LCD + 8 Fixed Buttons Control Panel	ROSS	RCP-QE18	1
Specification			
Key features: including followings			
18 backlit graphic LCD keys			
8 programmable function keys			
Frame; 1RU, depth 4.4 cm or similar			
Ethernet based control			
Ability to connect to primary and backup IP addresses for control redundancy			
Full function, programmable control panel			
Menu driven and single key configurations			
Multi-level menu programming			
Power supply included			
3.1.1.11 40 Button LCD Display Control Panel	ROSS	RCP-ME	1
Specification			
Key features: including followings			
40 fully illuminated LED backlit buttons			
Backlit 16x2 LCD display			
Ethernet connectivity			
Ability to connect to primary and backup IP addresses for control redundancy			
Frame; 1RU, depth 4.4 cm or similar			
Full function, programmable control panel			
Configurable as cut-bus, multi-cutbus or menu driven source / destination switching control panel			
Control up to 32 levels			
Power supply included			
3.2 PRODUCTION			
3.2.1 vMix Software 4K LIFETIME LICENSE (Customer Supplied)	vMix	vMix 4K	(1)
Specification			
Software type: Live production software to record and stream productions from workstation			
3.2.2 Workstation	Broadcast Solutions	custom build	1
Specification			

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Technical Specifications	Reference brand		Quantity
CPU:INTEL Core i9-10980XE 3.0GHz 24.75MB Cache Tray or superior			
RAM: DDR4 - 64 GB: 8 x 8 GB - DIMM 288-PIN - 3200 MHz or superior			
GPU: RTX4090 Trinity OC 24GB GDDR6X 3xDP 1xHDM or superior			
SSD: 2TB NVMe M.2 internal or superior			
HDD: 3x 4TB, 3.5" SATA 6Gb/s 7.2K or superior			
PSU: Seasonic Prime GX 850			
Keyboard and Mouse			
Microsoft Windows 11 Professional 64-Bit (EN)			
3.2.3 Rack Mount Kit	Broadcast Solutions	custom build	1
3.2.4 Video Card	Blackmagic Design	BDLKHCPRO8K12G	2
Blackmagic Design DeckLink 8K Pro 4 x bi-directional 12Gb/s SD/HD/2K/4K/8K. Supports single, dual link and quad link 4:2:2/4:4:4			
3.2.5 Multimedia Controller	Contour	Shuttle Pro v2	1
Specification			
Function and media control keys: including followings			
15 adjustable buttons			
Jog wheel			
Rubber wheel			
Function: including followings			
Stock or custom setting of control keys			
Control hub using in combination with PC keyboard and mouse			
Emulation of keyboard shortcut to improve productivity in OB Van			
Plug-and-play			
OS: Windows, OSX			
Dimensions:			
Length: approx. 200mm			
Width: approx. 110mm			
Height: approx. 30mm			
Weight: approx. 0.34kg			
3.2.6 Monitor	IYYAMA	XUB2292HS-B1	1
Specification			
Display			
Display panel: IPS			
Diagonal: 21.5"			
Native resolution: 1920 x 1080 or superior			
Aspect ratio 16:9			
Panel brightness: 250 cd/m ² or brighter			
Static contrast 1000:1 or better			
Advanced contrast 80M:1 or better			
Response time: 4ms or better			
Color support: 16.7mln			
Horizontal Sync: 30 - 85kHz			
Pixel pitch 0.248mm			
Signal input: including followings			
VGA x1			
HDMI x1			
DisplayPort x1			
Mechanical			
VESA mounting: 100 x 100mm			
Operating temperature range: 5°C to 35°C or wider			
Weight: 4.8kg or less			
Power supply: AC100 - 240V, 50/60Hz			
Power consumption: 18W typical			
Accessories: Manufacturer standard accessories			
3.2.7 Swivel Arm / Monitor Mount	Broadcast Solutions	custom build	1
Specification			
Type: Monitor mount, tabletop mount, swivel arm			
Material: Aluminum, steel			
Color: Black			
Suitable screen size: 13" to 27"			
Number of screens: 1			
Screen weight max.: 9kg or more			
VESA standard: including 100 x 100mm			
TILT movement: -40° to +40° or wider			
Swivel range: 180 °			
Rotate: 360°			
Max. length of arm: 520mm or more			
Max. height of arm: 620mm or more			
Height admission pole: 310mm or more			
Height adjustment: Continuous			
Cable management: included			
Weight: 3.5kg or less			
3.2.8 Tally Box System	SKAARHOJ	ETH-TALLY-LINK-V2	1
Specification			
Channels: 8			
Compatibility: including vMix			
Connectors: including followings			
8 x RJ45, Tally Outputs			
1 x RJ45, Ethernet port			
1 x Micro-USB, Data Port			
1 x DC, Power			
Indicators: 8 x LEDs			
LEDs: including followings			
1 x Main LED, Red, 1 x Operator LED, Red/Green			
Dimensions:			
Length: 165mm or less			
Width: 77mm or less			
Height: 30mm or less			
Weight: 0.35kg or less			
Power Supply: 12V			
3.3 REPLAY			
3.3.1 vMix Software 4K LIFETIME LICENSE (Customer Supplied)	vMix	vMix 4K	(1)

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Technical Specifications	Reference brand		Quantity
Specification			
Software type: Live production software to record and stream productions from workstation			
3.3.2 Workstation	Broadcast Solutions	custom build	1
Specification			
CPU: INTEL Core i9-10980XE 3.0GHz 24.75MB Cache Tray or superior			
RAM: DDR4 - 64 GB: 8 x 8 GB - DIMM 288-PIN - 3200 MHz or superior			
GPU: RTX4090 Trinity OC 24GB GDDR6X 3xDP 1xHDMI or superior			
SSD: 2TB NVMe M.2 internal or superior			
HDD: 3x 4TB, 3.5" SATA 6Gb/s 7.2K or superior			
PSU: Seasonic Prime GX 850			
Keyboard and Mouse			
Microsoft Windows 11 Professional 64-Bit (EN)			
3.3.3 Rasck Mount Kit	Broadcast Solutions	custom build	1
3.3.4 Video Card	Blackmagic Design	BDLKHCPRO8K12G	2
Blackmagic Design DeckLink 8K Pro 4 x bi-directional 12Gb/s SD/HD/2K/4K/8K. Supports single, dual link and quad link 4:2:2/4:4:4			
3.3.5 Replay Controller	SKAARHOJ	XC8	1
Specification			
Type: Universal Programmable Replay Controller Panel			
Features: including followings			
Jog-shuttle control with professional touch			
T-bar for playback speed control			
Clear OLED display visible in the dark			
Copy/paste section for clip banks			
Ethernet with PoE (IEEE802.3af)			
Compatibility: including vMix			
Dimensions:			
Length: 187mm or less			
Width: 180mm or less			
Height: 75mm or less			
Weight: 1.1kg or less			
Power Supply: 12V			
Accessories: Manufacturer standard accessories			
3.3.6 Monitor	IYYAMA	XUB2292HS-B1	1
Specification			
Display			
Display panel: IPS			
Diagonal: 21.5"			
Native resolution: 1920 x 1080 or superior			
Aspect ratio 16:9			
Panel brightness: 250 cd/m ² or brighter			
Static contrast 1000:1 or better			
Advanced contrast 80M:1 or better			
Response time: 4ms or better			
Color support: 16.7mln			
Horizontal Sync: 30 - 85kHz			
Pixel pitch 0.248mm			
Signal input: including followings			
VGA x1			
HDMI x1			
DisplayPort x1			
Mechanical			
VESA mounting: 100 x 100mm			
Operating temperature range: 5°C to 35°C or wider			
Weight: 4.8kg or less			
Power supply: AC100 - 240V, 50/60Hz			
Power consumption: 18W typical			
Accessories: Manufacturer standard accessories			
3.3.7 Swivel Arm / Monitor Mount	Broadcast Solutions	custom build	1
Specification			
Type: Monitor mount, tabletop mount, swivel arm			
Material: Aluminum, steel			
Color: Black			
Suitable screen size: 13" to 27"			
Number of screens: 1			
Screen weight max.: 9kg or more			
VESA standard: including 100 x 100mm			
TILT movement: -40° to +40° or wider			
Swivel range: 180 °			
Rotate: 360°			
Max. length of arm: 520mm or more			
Max. height of arm: 620mm or more			
Height admission pole: 310mm or more			
Height adjustment: Continuous			
Cable management: included			
Weight: 3.5kg or less			

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Technical Specifications	Reference brand		Quantity
3.4 MULTICAM RECORDING & PLAYOUT			
3.4.1 Four Channel HD Recorder	AJA	Ki Pro Ultra 12G	2
Specification			
Video Formats: including followings			
Single Channel Mode:			
(4K) 4096 x 2160p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(4K) 4096 x 2160PsF 23.98, 24, 25, 29.97*			
(UltraHD) 3840 x 2160p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(UltraHD) 3840 x 2160PsF 23.98, 24, 25, 29.97*			
(2K) 2048 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(HD) 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(HD) 1080i 25, 29.97, 30			
(HD) 1080PsF 23.98, 24, 25**, 29.97**			
(HD) 720p 50, 59.94, 60			
Multi-Channel Mode:			
(HD) 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(HD) 1080i 25, 29.97, 30			
(HD) 1080PsF 23.98, 24, 25**, 29.97**			
(HD) 720p 50, 59.94, 60			
*Only 4x 1.5G-SDI, 10-bit 4:2:2 YCbCr, Square Division			
**25 and 29.97 requires Record Type>PsF selection			
Codec Support: including followings			
Single Channel Mode:			
Apple ProRes 4444 XQ, up to 2K/60 fps			
Apple ProRes 4444, up to 30 fps			
Apple ProRes 422 (HQ)			
Apple ProRes 422			
Apple ProRes 422 (LT)			
Apple ProRes 422 (Proxy)			
Avid DNxHD HQX (220x)*			
Avid DNxHD SQ (145)*			
Avid DNxHD LB (36)**			
Avid DNxHR HQX up to 4K/29.97 fps			
Avid DNxHR SQ up to 4K/29.97 fps			
Avid DNxHR LB up to 4K/29.97 fps			
Multi-Channel Mode:			
Apple ProRes 4444, up to 30 fps			
Apple ProRes 422 (HQ)			
Apple ProRes 422			
Apple ProRes 422 (LT)			
Apple ProRes 422 (Proxy)			
*Avid DNxHD only supported for 1080 and 720 resolutions			
**Avid DNxHD 36 only supported for 1080p			
Codec Container: including followings			
Apple ProRes .MOV			
AVID DNX .MXF or .MOV			
Removable Storage: including followings			
2x slots, AJA SSD media PAK2000, PAK1000, PAK512, PAK256			
File System Support: including followings			
HFS+, exFAT			
Video Input Digital: including followings			
1x 12G-SDI, SMPTE-292/372/424/2081/2082			
3x 3G-SDI, SMPTE-292/372/424			
1x Fiber or HD-BNC 12G-SDI, SMPTE-297 (optional SFP modules)			
3x Fiber or HD-BNC, 3G-SDI, SMPTE-297 (optional SFP modules)			
4K/UltraHD 4:2:2 10bit & 4:4:4 10bit (BNC or Fiber)			
2K 4:2:2 10bit & 4:4:4 10/12bit (BNC or Fiber)			
Dual Link 4:2:2 10bit & 4:4:4 10/12bit (BNC or Fiber)			
Single Link 4:2:2 10bit & 4:4:4 10/12bit (BNC or Fiber)			
1x HDMI standard type A connector			
HDMI v2.0			
4:4:4 RGB 8/10/12-bit (deep color)			
4:2:2 YCbCr 8/10/12-bit			
4:2:0 YCbCr 8-bit			
Video Output Digital: including followings			
1x 12G-SDI, SMPTE-292/372/424/2081/2082			
3x 3G-SDI, SMPTE-292/372/424			
1x Fiber or HD-BNC 12G-SDI, SMPTE-297 (optional SFP modules)			
3x Fiber or HD-BNC, 3G-SDI, SMPTE-297 (optional SFP modules)			
4K/UltraHD 4:2:2 10bit & 4:4:4 10bit (12G BNC or Fiber)			
4K/UltraHD 4:2:2 10bit & 4:4:4 10bit (Quad link BNC)			
2K 4:2:2 10bit & 4:4:4 10/12bit (BNC or Fiber)			
Dual Link 4:2:2 10bit & 4:4:4 10/12bit (BNC or Fiber)			
Single Link 4:2:2 10bit & 4:4:4 10/12bit (BNC or Fiber)			
1x HDMI standard type A connector			
HDMI v2.0			
4:4:4 RGB 8/10/12-bit (deep color)			
4:2:2 YCbCr 8/10/12-bit			
4:2:0 YCbCr 8-bit			
Audio Input Digital: including followings			
16-channel, 24-bit SDI/Fiber embedded audio, 48kHz sample rate, synchronous			
8-channel, 24-bit HDMI embedded audio, 48kHz sample rate, synchronous			
8-channel, AES/EBU via (1x DB-25 TASCAM pinout)			
Audio Input Analog: including followings			
8-channel, mappable, 24-bit A/D analog audio, 48kHz sample rate (1x DB-25 TASCAM Pinout)			
+24dBu full scale digital			
+/- 0.2dB 20Hz to 20kHz frequency response			
Audio Output Digital: including followings			
16-channel, 24-bit SDI/Fiber embedded audio, 48kHz sample rate, synchronous			
8-channel, 24-bit HDMI embedded audio, 48kHz sample rate, synchronous			
8-channel, AES/EBU via (1x DB-25 TASCAM pinout)			
Audio Output Analog: including followings			
Stereo unbalanced headphone jack (1x 3.5mm jack) with volume control			
8-channel, 24-bit D/A analog audio, 48kHz sample rate (1x DB-25 TASCAM pinout)			
2-channel unbalanced 2x RCA connectors			
Recording Mode: including followings			
Multi-channel HD Apple ProRes recording (PAK2000, PAK1000, PAK512 (R1/X2 and above), PAK256 (R1/X2 and above))			
Single channel 4K/UltraHD/2K/HD recording			
Playback Mode: including followings			

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Technical Specifications	Reference brand	Quantity	
One channel of 4K/UltraHD/2K/HD at a time			
Timecode: including followings			
SDI RP188/SMPTE 12M via SDI BNC			
LTC input (1x BNC)			
LTC output (1x BNC)			
TC Super Out			
Reference Input: including followings			
External, 2x BNC			
Looping, nonterminating			
Input reference formats:			
(HD) Tri-level sync			
720p 59.94			
720p 50			
1080i 59.94			
1080i 50			
1080p 23.98			
1080PsF 23.98			
1080p 24			
1080PsF 24			
1080p 25			
1080PsF 25			
1080p 29.97			
1080PsF 29.97			
(SD) Analog composite			
525i 59.94			
625i 50			
Network Interface: including followings			
1x LAN connector (RJ-45 connector, 10/100/1000)			
Embedded web server for remote control			
Configuration and Transport Control via Web Interface			
Video Confidence Monitor via Web Interface			
Clip upload/download via Web Interface in DATA-LAN mode			
Remote control via REST			
Machine Control: including followings			
RS-422, 1x DB-9 female connector, Sony 9-pin protocol			
9-pin D-connector pinout is as follows:			
1 GND			
2 TX-			
3 RX+			
4 GND			
5 No Connection			
6 GND			
7 TX+			
8 RX-			
9 GND			
Shell GND			
User Interface: including followings			
Rotary selector knob			
Dedicated, backlit transport controls and menu buttons			
Large 1280x720 TFT LCD display with Video Monitor and Menu/Status Overlays			
Closed Captioning Support: including followings			
CEA-708, CEA-608			
Dimensions:			
Length: 270mm or less			
Width: 220mm or less			
Height: 85mm or less			
Weight: 2.6kg or less			
Power Supply:			
Dual, redundant power supply			
100-240VAC 50/60Hz (AC adapter)			
12-18VDC 4-pin XLR (chassis)			
Power consumption: 65W or less			
Operating Temperature: 0 to 40°C or wider			
Operating Relative Humidity: 10 to 90% noncondensing or wider			
Accessories: Manufacturer standard accessories			
3.4.2 Rackmount Shelf	AJA	2RU-Shelf for Rack	1
Specification			
Fits two 3.5.1 Four Channel HD Recorder units			
2 RU rack height			
For standard 19" racks			
3.4.3 SSD Recording Media	AJA	Pak 512 GB	4
Specification			
Media type: 512 GB SSD			
Use: for 3.5.1 Four Channel HD Recorder			
3.4.3 External Dock	AJA	PAK-DOCK-PRO	2
External Dock for All AJA PAK Modules with USB 3.2 Gen2 Connection to Host Computer			
3.5 STREAMING			
3.5.1 Output Server (Customer Supplied)	LiveU	LU10-SV-1UL02-V2	(1)
Specification			
LU2000 Dual HD Output Server (Upgradable to Quad)			
3.5.2 Talkback Device (Customer Supplied)	LiveU	LU10-IFB-002	(1)
Specification			
IFB Talkback device (one way)			
3.5.3 Audio Connect License (Customer Supplied)	LiveU	LU-LIC-AUD-INF8	(1)
Specification			
Yearly Audio Connect license for 8 audio interfaces assigned in the station side.			
Includes 1:1 intercom bidirectional audio communication or "many to many".			
Supported on all HEVC product line and LU-Smart.			
3.5.4 Video Transmission Encoder(Customer Supplied)	LiveU	LU610S	(1)
Specification			
Type: HEVC Single Channel1U rack-mount video transmission Encoder Includes standard software package - supporting up to 1080p60 (SDI & HDMI), up to 8Mbps live transmission			

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and 2 audio channels.			
Video resolutions: including 4Kp50/60/25/30/24,1080p50/60/25/30/24,1080i50/60, 720p50/60, PAL, NTSC			
Video interfaces: including 12G/3G/HD/SD-SDI + HDMI 2.0			
Video encoder: including H.265/HEVC, H.264, 1x video channel up to 4K			
Audio encoder: including AAC-HE/LC – up to 8 audio channels			
Simultaneous bonding: including followings			
Up to 3 connections			
2x Ethernet ports for connection to wired internet and satellite (BGAN/KU over IP), WiFi			
Operational Modes: including followings			
Live: ultra-low latency transmission			
Live & store: live streaming with local high-quality recording on unit			
Store & forward: stream in three quality-levels (for optimal quality vs speed)			
FTP: bonded file transfer			
Data Bridge: high-speed mobile broadband connectivity from the unit			
Video return: sub-second video return over an external HDMI			
Audio connect intercom			
Auto power up: Power-on feature suitable for automatic vehicle operation (power-on with vehicle)			
Network interfaces: including 2x RJ-45 Ethernet ports and 2.4/5GHz WiFi (802.11 a/b/g/n/ac)			
Other interfaces: including followings			
2x USB 2.0			
3.5mm audio jack			
min-XLR audio out			
full size SD card slot			
full size HDMI out.			
Antennas ports: 2x RP-SMA Wi-Fi + 12x SMA for cellular			
Dimensions:			
Length: 280mm or less			
Width: 436mm or less			
Height: 45mm or less			
Weight: 5kg or less			
Power: Dual power source 100-240VAC 50/60Hz			
Accessories: Manufacturer standard accessories			
3.5.5 3G/4G Antenna	LiveU	ANT00026	1
Specification			
Type: External dual band cellular antenna			
Antenna gain : 3dBi or more			
Number of internal cellular antenna: 2			
Antenna cable length: 3 m or longer			
Connector type at cable end: SMA			
3.6 SYNC PULSE GENERATOR			
3.6.1 Sync Pulse Generator	COURTYARD	CY460D-PKG/02	1
Specification			
Type: Sync, test pattern and time reference generator			
Features: including followings			
PAL/NTSC/625/525 switchable			
Comprehensive range of test patterns for all analogue and digital applications			
±4 field (PAL) / ±2 field (NTSC) timing range			
Multiple & configurable reference outputs (PAL/NTSC/Tri-Level Sync in all HD formats)			
4 LTC (standard and offset) or pulse outputs (User programmable)			
VITC on all SD outputs (User Select)			
Analogue stereo tone output with programmable interrupt			
Embedded audio			
Lock time to VITC on genlock ref. input			
User programmable & animated text idents (3) (independent on each test out)			
Text idents in any language (bitmap import)			
Multiple user configurable and independently adjustable reference outputs (NTSC color black, PAL Color Black & Tri-level Sync)			
10Mhz reference input			
Genlock to Color Black or Tri-Level Sync			
2 pairs independent SD (Std.), HD & 3G SDI color black and test patterns (with embedded tone/silence)			
AES digital tone, Silence, Word clock			
Remote control, NTP Server & Client over Ethernet			
Video inputs (BNC): including followings			
75Ω looping reference			
10MHz terminating reference			
Video outputs (BNC): including followings			
Analogue color black (2) Std.			
Analogue composite test (2) Std.			
Color black/tri-level (3 independent pairs)			
SDI (SD (Std.)/HD or 3G) color black with embedded silence (2 independent pairs)			
SDI (SD (Std.)/HD or 3G) test pattern with embedded tone (2 independent pairs)			
Balanced audio/AES/LTC outputs			
Unbalanced AES audio: including followings			
AES (2)			
DARS (1)			
Word clock (TTL) 2 BNC			
Controls and Indicators: including followings			
LCD Display, Rotary Knob & Switch			
Ethernet: 100Base T, RJ45			
GPS antenna input: SMB Jack			
Timecode outputs: including followings			
LTC 4 (user select)			
VITC (user select)			
Color black outputs: including followings			
Fsc stability: ±1Hz over temperature range			
SCH phase: 0 degrees ±5 degrees			
Return loss (to 5MHz): 35dB or more			
Sync pulse generator: including followings			
Subcarrier output			
Frequency: 4.43361875MHz after warm up (PAL)			
Stability: ±1Hz over temperature range*			
Amplitude: 1Vp-p			
Return loss (to 5MHz): 35dB or more			
Pulse and pattern outputs: including following			
Signals: meet or exceed relevant EBU, CCIR and SMPTE specifications			

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Technical Specifications	Reference brand		Quantity
Genlock: including followings			
H range: ±4 fields (PAL), moves all timing relative to the reference input			
Subcarrier: 0 to 360 degrees			
Resolution: 0.5 degrees of subcarrier or less			
Operating temperature range is 0 to +40°C			
Dimensions:			
Width: 445mm or less			
Depth: 405mm or less			
Height: 45mm or less			
Weight: 6kg or less			
Power Supply: Auto ranging 100 to 240V AC, 50/60Hz			
Power consumption: 21W or less			
Accessories: Manufacturer standard accessories			
3.6.2 HD SDI Output Option	COURTYARD	CY460/03	1
Specification			
HD SDI pattern & black output with embedders for 3.7.1 Sync Pulse Generator			
3.6.3 GPS Receiver/Antenna Option	COURTYARD	CY460/06	1
Specification			
GPS receiver including antenna, 8m cable and connector kit for 3.7.1 Sync Pulse Generator			
3.6.4 PTP Option	COURTYARD	CY460/GbEPTP	1
Specification			
PTP (Master or Slave) additional function for 3.7.1 Sync Pulse Generator			
3.6.5 NTP Option	COURTYARD	CY460/05	1
Specification			
NTP Client/Server additional function for 3.7.1 Sync Pulse Generator			
3.7 GLUE			
3.7.1 Rack Frame	LYNX	RFR 1000-1	1
Specification			
Dimensions:			
Width: 445mm or less			
Depth: 145mm or less			
Height: 45mm or less			
Weight: 1.6kg or less			
3.7.2 Power Supply	LYNX	RPS A100	2
Specification			
Output: including followings			
DC voltage: 12V			
Rated current: 8.33 A or more			
Rated power: 100W or more			
Ripple & noise: 240 mVp-p or less			
Line regulation: ±1.0%			
Load regulation: ±5.0%			
Input: including followings			
Voltage range: 100~240VAC			
Frequency range: 50~60Hz			
Input current: 2.0A or less			
Protection: including followings			
Short circuit protection: Auto recovery			
Over voltage protection: Latch-off			
Over current protection: Auto recovery			
Over temperature protection: Latch-off			
Operating temperature range: 0 to 40°C or wider			
Operating humidity range (non condensing) : 10% to 90% or wider			
Dimensions:			
Length: 140mm or less			
Width: 60mm or less			
Height: 35mm or less			
Weight: 0.45kg or less			
Accessories: Manufacturer standard accessories			
3.7.3 Analog Video Distribution Amplifier	LYNX	DVA 1714	4
Specification			
Input: including followings			
Connector: 1 x 75Ω BNC			
Compatible Input Sources: including followings			
SD TV Composite video (NTSC/PAL)			
SD TV Component analog video			
HDTV Component analog video			
SDTV Bi-level sync (or black burst)			
HDTV Tri-level sync			
Return loss (to 30MHz): 31dB or better			
Input gain adjustment range: +/- 2.5dB or wider			
Input cable equalization adjustment: 0 to 8dB or wider			
Input clamp			
Input presence detection (LED)			
Output: including followings			
Outputs: including 4 x Analog Video / Sync outputs			
Connector: 75Ω BNC			
Return loss (to 30MHz): 22dB or better			
Performance: including followings			
Frequency Response:			
-3dB @ 30MHz (EQ min) or better			
-3dB @ 37MHz (EQ max) or better			
+/- 0.1dB to 10MHz or less			
Signal to noise (RMS): 60dB or better			
Operating temperature range: 5 to 40°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Length: 140mm or less			
Width: 90mm or less			
Height: 25mm or less			
Weight: 220g or less			
Power supply: +12VDC @ 1.3W nominal			

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Technical Specifications	Reference brand		Quantity
Accessories: Manufacturer standard accessories			
3.7.4 SDI Distribution Amplifier	LYNX	DVD 1823	2
Specification			
Input: including followings			
Inputs: 2 x SDI			
Connector: 75Ω BNC			
SMPTE 424M, SMPTE 292M, SMPTE 259M			
Multi-standard operation from 270Mbit/s to 3Gbit/s			
Multi-rate reclocking			
Input present LED indication for each channel			
Return Loss:			
from 5MHz to 1.5GHz: 15dB or better			
from 1.5GHz to 3GHz: 10dB or better			
Automatic cable equalizing (in case of Belden 1694A cable)			
250 m @ 270Mbit/s			
190 m @ 1.5Gbit/s			
130 m @ 3Gbit/s			
Output: including followings			
Outputs: 3 x multi-rate relocked SDI outputs per channel			
Connector: 75Ω BNC			
SMPTE 424M, SMPTE 292M, SMPTE 259M			
Return Loss:			
from 5MHz to 1.5GHz: 15dB or better			
from 1.5GHz to 3GHz: 10dB or better			
Alignment Jitter			
0.2 UI or less @ 270Mbit/s			
0.2 UI or less @ 1.5Gbit/s			
0.3 UI or less @ 3Gbit/s			
Timing Jitter			
0.2 UI or less @ 270Mbit/s			
1.0 UI or less @ 1.5Gbit/s			
2.0 UI @ 3Gbit/s			
Operating temperature range: 5 to 40°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Length: 140mm or less			
Width: 90mm or less			
Height: 25mm or less			
Weight: 240g or less			
Power supply: +12VDC @ 2.7W nominal			
Accessories: Manufacturer standard accessories			
3.7.5 3G/HD/SD-SDI Distribution Amplifier	LYNX	DVD 1817	2
Specification			
Input: including followings			
Input: 1 x SDI			
Connector: 75Ω BNC			
SMPTE 424M, SMPTE 292M, SMPTE 259M			
Multi-standard operation from 270Mbit/s to 3Gbit/s			
Multi-rate reclocking			
Input present LED indication			
Return Loss:			
from 5MHz to 1.5GHz: 15dB or better			
from 1.5GHz to 3GHz: 10dB or better			
Automatic cable equalizing (in case of Belden 1694A cable)			
320 m @ 270Mbit/s			
200 m @ 1.5Gbit/s			
150 m @ 3Gbit/s			
Output: including followings			
Outputs: 7 x multi-rate relocked SDI outputs			
Connector: 75Ω BNC			
SMPTE 424M, SMPTE 292M, SMPTE 259M			
Return Loss:			
from 5MHz to 1.5GHz: 15dB or better			
from 1.5GHz to 3GHz: 10dB or better			
Alignment Jitter			
0.2 UI or less @ 270Mbit/s			
0.2 UI or less @ 1.5Gbit/s			
0.3 UI or less @ 3Gbit/s			
Timing Jitter			
0.2 UI or less @ 270Mbit/s			
1.0 UI or less @ 1.5Gbit/s			
2.0 UI @ 3Gbit/s			
Operating temperature range: 5 to 40°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Length: 140mm or less			
Width: 90mm or less			
Height: 25mm or less			
Weight: 240g or less			
Power supply: +12VDC @ 2.8W nominal			
Accessories: Manufacturer standard accessories			
3.7.6 12Gbit Dual 1 > 3 SDI Reclocking Distribution Amplifier	LYNX	DVD 1423	2

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Technical Specifications	Reference brand		Quantity
<p>Input 2 x SDI; 75 Ohm BNC connector SMPTE 424M, SMPTE 292M, SMPTE 259M, SMPTE 2081, SMPTE 2082 Multi-standard operation from 270Mbit/s to 12Gbit/s; reclocking Input present LED indication Electrical Return Loss: >15dB from 5MHz to 1.5GHz, >10dB from 1.5GHz to 3GHz, >7dB from 3GHz to 6GHz; >4dB from 6GHz to 12GHz Automatic cable EQ 400m @ 270Mbit/s, 200m @ 1.5Gbit/s, 150m @ 3Gbit/s (Belden 1694 cable) 90m @ 6Gbit/s; 80m @ 12Gbit/s (Belden 4794R cable) Outputs 3 x multi-rate reclocked SDI outputs per channel ; 75 Ohm BNC connectors SMPTE 424M, SMPTE 292M, SMPTE 259M, SMPTE 2081, SMPTE 2082 Electrical Return Loss: >15dB from 5MHz to 1.5GHz, >10dB from 1.5GHz to 3GHz, >7dB from 3GHz to 6GHz; >4dB from 6GHz to 12GHz Alignment Jitter < 0.2 UI @ 270Mbit/s, < 0.2 UI @ 1.5Gbit/s, < 0.3 UI @ 3Gbit/s, , 6Gbit/s; 12Gbit/s Timing Jitter < 0.2 UI @ 270Mbit/s, < 1.0 UI @ 1.5Gbit/s, < 2.0 UI @ 3Gbit/s, 6Gbit/s; 12Gbit/s Power +12VDC @ 3.3W nominal - (supports 7 - 16VDC input range) Physical Size: 138mm x 90mm x 22mm; Weight: 240g</p>			
3.7.7 Frame Synchronizer	AJA	FS-4	1
Specification			
Modes of Operation: including followings			
Four channel mode: 4x Independent 2K, HD, or SD video processors			
Single channel mode - 1x 4K, UltraHD, 2K, HD, or SD video processor			
Enhanced single channel mode - 1x 4K, UltraHD video processor with simultaneous 4K/UltraHD and 2K/HD/SD outputs			
Video Formats: including followings			
(4K) 4096 x 2160p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(4K) 4096 x 2160PsF 23.98, 24, 25, 29.97, 30			
(UltraHD) 3840 x 2160p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(UltraHD) 3840 x 2160PsF 23.98, 24, 25, 29.97, 30			
(2K) 2048 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(HD) 1920 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(HD) 1920 x 1080PsF 23.98, 24, 25, 29.97, 30			
(HD) 1920 x 1080i 50, 59.94, 60			
(HD) 1280 x 720p 50, 59.94, 60			
(SD) 625i 50 • (SD) 525i 59.94			
YCbCr, 4:2:2, 10-bit			
Video Input Digital: including followings			
4x 3G-SDI inputs, 4x BNC			
4x 12G-SDI inputs, 4x Fiber or HD-BNC (optional SFP modules)			
SFP coax module, 12G/6G-SDI, dual HD-BNC			
SFP fiber module, 12G/6G-SDI, Single Mode, dual LC or single LC, SMPTE 297			
SFP fiber module, 3G-SDI, Single Mode, dual LC, single LC, or single SC, SMPTE 297			
SFP fiber module, 3G-SDI, Multi-Mode, dual LC or single LC, SMPTE 297			
12G/6G/3G/HD/SD, SMPTE 259/292/424/2081/2082			
Single link 12G/6G-SDI (with optional SFP module)			
Quad link 3G-SDI level A or B DL (4x 3G), SMPTE 425-5			
Dual link 3G-SDI level B DS (2x 3G), SMPTE 425-3			
Single link 3G-SDI level A, B DL, or B DS, SMPTE 425			
Quad link HD-SDI (4x 1.5G)			
Dual link HD-SDI (2x 1.5G), SMPTE 372			
Single link HD/SD			
Quadrant (Square Division) or 2SI (Two Sample Interleave) 4K/UltraHD input pixel mapping			
8x 1 selector feeds video processor(s)			
Video Output Digital: including followings			
4x 3G-SDI outputs, 4x BNC			
4x 12G-SDI outputs, 4x fiber or HD-BNC (optional SFP modules)			
SFP coax module, 12G/6G-SDI, dual HD-BNC			
SFP fiber module, 12G/6G-SDI, Single Mode, dual LC or single LC, SMPTE 297			
SFP fiber module, 3G-SDI, Single Mode, dual LC, single LC, or single SC, SMPTE 297			
SFP fiber module, 3G-SDI, Multi-Mode, dual LC or single LC, SMPTE 397			
12G/6G/3G/HD/SD, SMPTE 259/292/424/2081/2082			
Single link 12G/6G-SDI (with optional SFP module)			
Quad link 3G-SDI level A or B DL (4x 3G), SMPTE 425-5			
Dual link 3G-SDI level B DS (2x 3G), SMPTE 425-3			
Single link 3G-SDI level A, B DL, or B DS, SMPTE 425			
Quad link HD-SDI (4x 1.5G)			
Dual link HD-SDI (2x 1.5G), SMPTE 372			
Single link HD/SD			
Quadrant (square division) or 2SI (two sample interleave) 4K/UltraHD output pixel mapping			
Monitor Output Digital: including followings			
Monitor output is a copy of the Main output			
1x BNC, 1x 3G-SDI output			
3G-SDI/HD/SD, SMPTE 259/292/424, 10-bits			
4K/UltraHD automatically down-converted to 2K/HD			
SDI Monitor output is configurable when system is operating in enhanced single channel node			
Video formats			
(2K) 2048 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(HD) 1920 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60			
(HD) 1920 x 1080PsF 23.98, 24, 25, 29.97, 30			
(HD) 1920 x 1080i 50, 59.94, 60			
(HD) 1280 x 720p 50, 59.94, 60			
(SD) 625i 50			
(SD) 525i 59.94			
1x HDMI, 1x HD output			
2K/HD/SD, HDMI v1.4a			
4K/UltraHD automatically down-converted to 2K/HD			
HDR Infoframe generation to support HDR displays per HDMI v2.0b and CTA-861-G			

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Technical Specifications	Reference brand	Quantity
Crop control		
Video Processing: including followings		
Motion adaptive deinterlacer		
Proc amp controls		
Color corrector		
Legalizer		
Frame rate conversion/film cadence removal/insertion (3:2, 1:2, 2:1, 2:3)		
Adjustable delay 0-20 frames with H and V timing controls in lines and pixels		
Freeze (manual or on input signal loss) to black or last good frame		
Matte generator for background fill		
Video test generator with SDR and HDR patterns		
Nominal video delay HD/SD, 2 frames (LFR), 4 frames (HFR)		
Ancillary Data: including followings		
All embedded ANC packets pass-through when output format equals input format		
Ancillary timecode (LTC, VITC1, VITC2) translation and pass-through for wide range of conversions		
SCTE-104 and closed captioning pass-through for wide range of conversions		
Closed captioning conversion (CEA-608/CEA-708)		
AFD input detection, down-convert control, and output pass-through or overwrite		
Configurable SDI output VPID for colorimetry and transfer characteristic		
Format Conversion: including followings		
Convert any supported input format to any supported output format, within the same frame rate family. These three families are:		
59.94, 29.97, 23.98		
50, 25		
60, 30, 24		
Scaling: including followings		
Supported in 2K/HD/SD formats		
Zoom in and out		
Reposition		
Region of Interest (ROI)		
Up-Conversion: including followings		
Hardware 10-bit		
Zoom 14:9: results in a 4:3 image zoomed slightly to fill a 14:9 image with black side bars		
Zoom Letterbox: results in image zoomed to fill full screen		
Zoom Wide: results in a combination of zoom and horizontal stretch to fill a 16:9 screen; this setting will introduce a small aspect ratio change		
Down-Conversion: including followings		
Hardware 10-bit		
Anamorphic: full screen		
Letterbox: image is reduced with black top and bottom added to image area with the aspect ratio preserved		
Crop: image is cropped to fit video output format		
Aspect Ratio Conversion for SD to SD		
Letterbox: Transforms SD anamorphic material to a letterboxed image		
H Crop: Produces a horizontally stretched effect on the image; transforms anamorphic SD to full frame		
SD Pillar box: Produces an image in the center of the screen with black borders on the left and right sides and an amorphized image in the center		
V Crop: Transforms SD letterbox material to an anamorphic image		
Audio Input Digital: including followings		
48kHz sample rate		
8x SDI embedded inputs (16-Channels each)		
128-channels, 24-bit (20-bit SD), SMPTE 272/299		
8x balanced AES inputs (16-channels), 1x DB-25		
16-channels, 24-bit, AES-3		
2x MAD I inputs, 1x BNC, 1x ST Fiber		
128-channels, 24-bit, AES-10		
Audio Output Digital: including followings		
48kHz sample rate		
1x SDI embedded output per Video Processor (16-Channels each)		
16-channels (in single Video Processor mode), 24-bit (20-bit SD), SMPTE 272/299		
64-channels (in four Video Processor mode), 24-bit (20-bit SD), SMPTE 272/299		
8x balanced AES outputs (16-channels), 1x DB-25		
16-channels, 24-bit, AES-3		
2x MAD I outputs, 1x BNC, 1x ST Fiber		
128-channels, 24-bit, AES-10		
Audio Processing: including followings		
277 x 208 mono audio matrix, route 1 to 1, 1 to many		
Inputs: 128 embedded, 16 AES, 128 MAD I, 2 stereo mixdowns, 3 tone generator		
Outputs (Four Channel Mode): 16 AES, 128 MAD I, 64 embedded		
Outputs (Single Channel Mode): 16 AES, 128 MAD I, 16 embedded		
Input adjustment controls for each channel		
Gain +18 to -18dB in 0.5dB steps		
Phase invert		
Input adjustment controls for each channel pair		
Delay -16ms to +1sec in 20.8 us steps		
Audio delay can automatically follow video timing delay adjustments		
Two independent 5.1 or 7.1 to stereo mixdown processors with gain adjust		
High quality Sample Rate Conversion (SRC) supported on all audio inputs		
SRC bypass for non-PCM audio (e.g. Dolby E, AC-3, etc.)		
Audio tone generator (mute, 400Hz, 1kHz)		
Reference Input: including followings		
External, 2x BNC		
Looping, nonterminating		
Blackburst or tri-level sync		
Genlock: including followings		
Lock to External Reference		
Lock to SDI input 1 thru 8		
Free run based on Temperature Compensated Crystal Oscillator		
Network Interface: including followings		
1x RJ-45, 10/100/1000 Ethernet		
Embedded web server for remote control		
REST Interface		
SNMP		
Front Panel: including followings		
Display		
Keypad with status LEDs		
Two rotary/push knobs		
Comprehensive alarm indicators		

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Technical Specifications	Reference brand		Quantity
Presets: including followings			
Four Channel and Single Channel Mode each support 40 system level Presets			
GPI: including followings			
1x 25-pin D-Connector			
Four optically isolated GPI inputs			
Four optically isolated GPO outputs			
Operating temperature range: 0 to 40°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Depth: 407mm or less			
Width: 445mm or less			
Height: 45mm or less			
Weight: 3.6kg or less			
Power supply: 100-240VAC 50/60Hz (Dual, redundant power supplies)			
Power consumption: 70W or less			
Accessories: Manufacturer standard accessories			
3.7.8 12G/6G-SDI Dual Coax HD-BNC Receiver	AJA	HDBNC-2RX-12G	1
3.7.9 12G/6G-SDI Dual Coax HD-BNC Transmitter	AJA	HDBNC-2TX-12G	1
3.7.10 4K HDMI/SDI Cross Converter w/ Scaling & Frame Rate Conversion	Decimator	DD-12G-CROSS	4
3.7.11 Power Pack + 12V DC	Decimator	PWR-12V_ML	4
3.7.12 Distribution Amplifier	sonifex	RB-DA6G	2
Specification			
Maximum input level:+28dBu or more			
Maximum output level:+28dBu or more			
Frequency response: 20Hz to 20kHz ±0.1dB (600Ω load, ref 1kHz)			
Gain range: Adjustable 8dB loss to 18dB gain (12 adjustable pots)			
Common mode rejection: 66dB typical			
Input impedance: 20kΩ bridging or more			
Output impedance: 50Ω or less			
Distortion: 0.01% THD @ 1kHz, ref +8dBu output			
Noise: -88dB unity gain, ref +8dBu output			
Connections: including followings			
Inputs: 2 x XLR 3 pin female (balanced, can be unbalanced)			
Outputs: 12 x XLR 3 pin male (balanced, can be unbalanced)			
Dimensions:			
Depth: 108mm or less			
Width: 480mm or less			
Height: 42mm or less			
Weight: 1.9kg or less			
Power supply: 220-240VAC 50/60Hz			
Power consumption: 6W or less			
Accessories: Manufacturer standard accessories			
3.8 VIDEO MONITORING & MEASUREMENT EQUIPMENT			
3.8.1 Production			
3.8.1.1 Monitor	IYYAMA	LH4342UHS-B3	1
Specification			
Display			
Display panel: IPS			
Diagonal: 42.5"			
Native resolution: 3840 x 2160 or superior			
Aspect ratio 16:9			
Panel brightness: 500 cd/m ² or brighter			
Static contrast 1300:1 or better			
Advanced contrast 80M:1 or better			
Response time: 9ms or better			
Color support: 1.07G			
Horizontal Sync: 30 - 80kHz			
Pixel pitch 0.245mm			
Signal input: including followings			
DVI x1			
HDMI x 3			
DisplayPort x 1			
Mechanical			
VESA mounting: 200 x 200mm			
Operating temperature range: 0°C to 40°C or wider			
Weight: 10.7kg or less			
Power supply: AC100 - 240V, 50/60Hz			
Power consumption: 116W typical			
Accessories: Manufacturer standard accessories			
3.8.1.2 Cross Converter	Decimator Design	MD-LX	1
Specification			
SDI Format: including followings			
3G-A or 3G-B:SMPTE 424M@2.97 and 2.967Gb/s			
1080p@60/59.94/50Hz			
HD:SMPTE 292M/274M/296M@1.485 and 1.435Gb/s			
1080i@60/59.94/50Hz			
1080p/psf@30/29.97/25/24/23.98Hz			
720p@60/59.94/50/30/29.97/25/24/23.98Hz			
SD:SMPTE 259M@270Mb/s			
625i50 (PAL)			
525i59.94 (NTSC)			
HDMI Format: including followings			
1080p@60/59.94/50/30/29.97/25/24/23.98Hz			
1080i@60/59.94/50Hz			
720p@60/59.94/50/30/29.97/25			
625i50 (PAL)			
525i59.94 (NTSC)			
Input: including followings			
1 x HDMI Type A			
1 x (3G/HD/SD)-SDI			
Micro USB for power, control and firmware updates			
Output: including followings			
1 x HDMI Type A			

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Technical Specifications	Reference brand		Quantity
1 x (3G/HD/SD)-SDI			
Dimensions:			
Length: 74mm or less			
Width: 60mm or less			
Height: 23mm or less			
Power supply: USB Power +4.4V to +5.25V DC			
Power consumption: 2.5W or less			
Accessories: Manufacturer standard accessories			
3.8.2 Engineer			
3.8.2.1 Broadcast Monitor	KONVISION	KUM-2410W	1
24" 4K HDR Monitor with 12G-SDI Panel Display Size: 24" Resolution: 3840x2160 Aspect Ratio: 16 : 9 Viewing Angle: 178°(H) / 178°(V) Pixel Pitch: 0.13725x0.13725(mm) Color Depth: 1.07B Back Light: LED Brightness: 540cd/m2 Contrast Ratio: 2000:1 INPUT 2x BNC: 12G-SDI 1/2signal inputs(Auto-detected and compatible to 6G/3G/HD/SD-SDI) 2x BNC: 3G-SDI 3/4 signal inputs(3G/HD/SD-SDI auto detected) 1 x SDI SFP+: SDI SFP+ input cage 1 x HDMI 2.0 (optional): HDMI 2.0 Signal 2x BNC: 12G-SDI 1/2signal outputs(Auto-detected and compatible to 6G/3G/HD/SD-SDI) 2x BNC: 3G-SDI 3/4 signal outputs(3G/HD/SD-SDI auto detected) GENERAL Operating Temperature: -10°~ 50° Input Voltage: DC 12V & AC 100-240V 50/60Hz Power Consumption: 70 W Power-Saving Mode: Turn off unimportant key Automatically if no signal input VESA Installation: VESA MIS-D(100X100mm) Accessory: Power Cord /Desktop stand			
3.8.2.2 Multi Viewer	Decimator Design	DD-6S	1
Specification			
SDI Input & Output Formats: including followings			
3G:SMPTE 424M@2.97 and 2.967Gb/s			
1080p@60/59.94/50Hz			
HD:SMPTE 292M/274M/296M@1.485 and 1.435Gb/s			
1080i@60/59.94/50Hz			
1080p/psf@30/29.97/25/24/23.98Hz			
720p@60/59.94/50/30/29.97/25/24/23.98Hz			
SD:SMPTE 259M@270Mb/s			
625i50			
525i59.94			
HDMI Output Formats: including followings			
1080p@60/59.94/50Hz			
1080i@60/59.94/50Hz			
1080p@30/29.97/25/24/23.98Hz			
720p@60/59.94/50/30/29.97/25			
625i50 / 525i59.9			
LCD / Button Menu Options: including followings			
HDMI output type			
Output Select			
Multi-Viewer Output Format			
Multi-Viewer Number of Windows			
Multi-Viewer Layout			
Multi-Viewer Audio Source			
Multi-Viewer Reference			
Full Screen is Scaled			
Input Routing			
GPI mode			
Setup			
Input: including followings			
• 6 x (3G/HD/SD)-SDI			
• Input Equalization > 100M using Belden 1694A			
• USB for control and updates			
Output: including followings			
6 x SDI (3G/HD/SD)-SDI Active Loop-throughs			
2 x SDI (3G/HD/SD)-SDI			
HDMI Type A			
LED Status: including followings			
Power			
6 x Signal lock and rate			
Dimensions:			
Length: 220mm or less			
Width: 104mm or less			
Height: 30mm or less			
Power supply: +5V to +3.2V DC			
Accessories: Manufacturer standard accessories			
3.8.2.3 LCD Screen	BLACKMAGIC DESIGN	BM-HDL-SMTVDUO2	1
Specification			
Type: Two independent 8 inch LCD screens in a compact rack mount design			
Automatically switches between SD, HD and 3G-SDI			
Auto detection of 2K, HD or standard definition inputs.			
I/O Ports: including followings			
Monitor1: SD/HD SDI In and Out			
Monitor2: SD/HD SDI In and Out			
Ethernet: 10/100 BaseT with loop through.			
Tally: 9-pin D connector			
Display Resolution: 800 x 480 pixels			
Response: 15 ms or shorter			
Contrast Ratio: 500:1 typical			

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Technical Specifications	Reference brand		Quantity
Color Depth: 16.7 Million Colors.			
SDI Compliance: including followings			
SMPTE 259M, SMPTE 292M, SMPTE 296M, SMPTE 372M, SMPTE 424M Level B and SMPTE 425M			
SDI Color Space: REC 601, REC 709			
SDI Auto Switching:			
Automatically selects between SD, HD and 3 Gb/s SDI			
Video Sampling: 4:2:2 and 4:4:4			
SDI Format Support: including followings			
525i59.94 NTSC, 625i50 PAL, 720p50, 720p59.94, 720p60			
1080p23.98, 1080p24, 1080p25, 1080p29.97, 1080p30, 1080p50, 1080p59.94, 1080p60,			
1080PsF23.98, 1080PsF24, 1080PsF25, 1080PsF29.97, 1080PsF30			
1080i50, 1080i59.94, 1080i60			
2K Format Support: including followings			
2K DCI 23.98p, 2K DCI 24p, 2K DCI 25p			
2K DCI 23.98PsF, 2K DCI 24PsF, 2K DCI 25PsF			
Operating temperature range: 0 to 40°C or wider			
Operating humidity range (non condensing): 0% to 90% or wider			
Dimensions:			
Depth: 35mm or less			
Width: 482mm or less			
Height: 135mm or less			
Weight: 1.45kg or less			
Power supply: 12VDC			
Power consumption: 20W or less			
Accessories: Manufacturer standard accessories			
3.8.2.4 Monitor	IYYAMA	XUB2494HS-B2	1
Specification			
Display			
Display panel: VA matrix, matte finish			
Diagonal: 23.8"			
Native resolution: 1920 x 1080 or superior			
Aspect ratio 16:9			
Panel brightness: 250 cd/m ² or brighter			
Static contrast: 3000:1 or better			
Advanced contrast 80M:1 or better			
Response time: 4ms or better			
Color support: 16.7 mln			
Horizontal Sync: 30 - 85kHz			
Pixel pitch 0.275mm			
Signal input: including followings			
HDMI x 1			
DisplayPort x 1			
Mechanical			
VESA mounting: 100 x 100mm			
Operating temperature range: 5°C to 35°C or wider			
Weight: 4.8kg or less			
Power supply: AC100 - 240V, 50/60Hz			
Power consumption: 19W typical			
Accessories: Manufacturer standard accessories			
3.8.2.5 Cross Converter	Decimator Design	MD-LX	1
Specification			
SDI Format: including followings			
3G-A or 3G-B:SMPTE 424M@2.97 and 2.967Gb/s			
1080p@60/59.94/50Hz			
HD:SMPTE 292M/274M/296M@1.485 and 1.435Gb/s			
1080i@60/59.94/50Hz			
1080p/psf@30/29.97/25/24/23.98Hz			
720p@60/59.94/50/30/29.97/25/24/23.98Hz			
SD:SMPTE 259M@270Mb/s			
625i50 (PAL)			
525i59.94 (NTSC)			
HDMI Format: including followings			
1080p@60/59.94/50/30/29.97/25/24/23.98Hz			
1080i@60/59.94/50Hz			
720p@60/59.94/50/30/29.97/25			
625i50 (PAL)			
525i59.94 (NTSC)			
Input: including followings			
1 x HDMI Type A			
1 x (3G/HD/SD)-SDI			
Micro USB for power, control and firmware updates			
Output: including followings			
1 x HDMI Type A			
1 x (3G/HD/SD)-SDI			
Dimensions:			
Length: 74mm or less			
Width: 60mm or less			
Height: 23mm or less			
Power supply: USB Power +4.4V to +5.25V DC			
Power consumption: 2.5W or less			
Accessories: Manufacturer standard accessories			
3.8.2.6 Waveform Monitor	LEADER	LV5350	1
Waveform Monitor (Main Body, With SDI (Without Eye))			

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Technical Specifications	Reference brand		Quantity
<p>Screen Size (Diagonal): 7" / 178 mm Display: TFT Color Liquid Crystal Resolution: 1920 x 1080 at 60, 59.94, and 50 Hz Touch Panel Type: Electrostatic Capacity Resolution: Up to 2048 x 1020 at 60 fps Bit Depth: 10- and 12-Bit Signal Support: SD, HD, 3G, and 12G-SDI Single-Link Formats Color Space: BT.709, BT.2020, or DCI P3 Controls: Touchscreen, Mouse, and Front-Panel Buttons Input Signals: TLS or NTSC/PAL, Black Burst Signal, and Field ID Correspondence Function: SDI Reference Signal Input for Video Signal Waveform Display and Phase Difference</p> <p>Connectors: 2 x BNC, SDI Video Input 2 x BNC, SDI Video Output 1 x BNC, Video Reference Input 1 x BNC, Video Reference Loop-Through 2 x USB 2.0 Type-A, Control Port (Front) 1 x 4-Pin XLR, DC Power Input 1 x 15-Pin Sub-D Female, Remote Port 1 x RJ45, Ethernet Port 1 x 1/8" / 3.5 mm Jack, Headphones Output (Front) USB CompatibilityMemory, Mouse, and Touch-Panel Type Monitor</p> <p>Output Signals SupportedHD, 3G-A, 3G-B-DL, and Single-Link T.M.D.S StandardIEEE802.3 Protocol SupportTELNET, FTP, SNMP, HTTP, and SNTIP Ethernet Support10Base-T, 100Base-TX, and 1000Base-T Embedded AudioSMPTE ST 299, SMPTE ST 272, 48 kHz, 24-Bit, and L-PCM StandardITU-R BT.2100 (HLG, PQ), and S-Log 3 Supported FormatAll Except for SD and XYZ Input of SDI. Pattern Type100% Color Bar, 75% Color Bar, HD Multi-Format Color Bar, Color Raster, Cross Hatch, 10 Steps, Limit Lamp, Check Field, and Lip Sync pattern. Speed Range4 to 124 Dots per Frame ColorWhite, Yellow, Cyan, Green, Magenta, Red, Blue, and Black Noise Level20 dBFS, -18 dBFS, 0 dBFS, and Mute *Frame Rate for Horizontal 4096/2048 Pixel Format at Frame Input Impedance15 Kilohms Passive Loop Through Input Return Loss: more than 30 dB Maximum Input Voltage± 5 VDC + Peak AC Control SignalLV- TTL Level</p>			
3.8.2.7 AC ADAPTER	LEADER	GST90A12	1
AC ADAPTER for LV5300, LV5350 and LV7300			
3.8.2.8 Dual RACKMOUNT Adapter	LEADER	LR2530	1
Dual RACKMOUNT Adapter for LV5350			
3.8.2.9 BLANK PANEL	LEADER	LC2535	1
BLANK PANEL for LR2530			
4. AUDIO			
4.1 AUDIO MIXER			
4.1.1 Digital Mixer	Allen&Heath	SQ5	1
Specification			
Overview: including followings			
Rack-mountable Digital Mixer for Live, Studio and Installation			
48 Input Channels			
16 Local Mic Inputs (XLR)			
2 ¼" Stereo Inputs (TRS)			
1 3.5mm Stereo Input			
36 Total Busses			
12 Stereo Mix (Aux or Group) + Main			
PAFL Bus			
14 Assignable Local Outputs (12 XLR + 2 ¼" TRS)			
AES Digital Output			
Dedicated Talkback mic input (XLR)			
¼" TRS Headphone out with dedicated control			
SLink EtherCON connection for remote audio using dSnake/ME, DX or			
GigaACE/GX protocol (128x128 channels)			
I/O Port for Option Card (including 3rd party protocols – Dante/Waves)			
8 Mute Groups			
8 DCA Groups			
8 Stereo FX with dedicated FX Returns			
DEEP Processing Ready			
RackFX Effects suite			
7" color touchscreen			
8 Assignable SoftKeys			
Dedicated physical controls for channel processing			
(Gain, HPF Frequency, Gate Threshold, Compressor			
Threshold, Pan, EQ Gain/Frequency/Width)			
16+1 Faders with 6 Layers for 96 assignable Channel Strips			
Motorized faders for sends on faders, GEQ fader flip and mix recall			
16 Backlit LCD Channel Strip displays			
Chromatic Channel Metering			
Integrated Surface Illumination			
Single/Dual Footswitch Control			
Input channel pairs switchable mono/stereo			
Patchable Insert points			
Input processing – Trim, HPF, Gate, PEQ, Compressor, Delay			
Output processing – Graphic EQ, PEQ, Compressor, Delay			
DEEP Automatic Mic Mixing			
2 31/61 Band Real Time Analyzers			
Quick copy/paste/reset for parameters			
User Permissions to restrict operator access			
300 Scene memories per show			
Channel Safes, Global and per Scene Recall Filters			
FX, processing and channel Libraries			
SQ-Drive for stereo and multitrack recording/playback direct to USB drive			
USB transfer of Scenes, Libraries, Shows			
32x32 channel USB streaming to/from Mac/PC			

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Technical Specifications	Reference brand	Quantity
MIDI via USB or TCP/IP, including DAW control options		
Remote mixing apps for iPad, Android, Mac and PC		
Compatible with ME personal monitoring range		
Mixer		
Input: equivalent to followings or superior		
Mic/Line inputs: Balanced XLR, fully recallable		
Input sensitivity: -60 to +0dBu		
Switchable pad: -20dB		
Analogue gain: 0dB to +60dB, 1dB steps		
Maximum input Level: +30dBu		
Input impedance: 5kΩ or more		
THD+N, unity gain 0dB: 0.002% -92dBu (20Hz-20kHz, AES Direct Out, @0dBu 1kHz)		
THD+N, Mid gain +30dB: 0.003% -91dBu (20Hz-20kHz, AES Direct Out, @-30dBu INPUT 1kHz)		
Phantom power: +48V (+3V / -2V)		
Stereo Line Inputs		
ST1, ST2 connectors Balanced, 1/4" TRS jack		
ST3 connector Unbalanced, stereo 3.5mm Mini Jack		
Input Sensitivity (ST1, ST2 / ST3): Nominal +4dBu ST1, ST2 / 0dBu ST3		
Trim: +/-24dB		
Maximum Input Level (ST1,ST2 / ST3): +22dBu / +18dBu		
Input Impedance: 7kΩ or more		
Output: equivalent to followings or superior		
XLR outputs: Balanced, XLR		
Outputs A and B: Balanced 1/4" TRS Jack		
Source: Patchable		
Output impedance: 75Ω or more		
Nominal output +4dBu = 0dB meter reading		
Maximum output level: +22dBu		
Residual Output Noise: -90dBu (muted, 20Hz-20kHz)		
AES digital output: Balanced XLR 2 channel, 96kHz sampling rate (Default with SRC Bypassed)		
Switchable output sample rates, 44.1kHz/ 48kHz/ 88.2kHz/ (96kHz)		
2.5Vpp balanced terminated 110G		
SLink: equivalent to followings or superior		
Connection: RJ45		
dsnake mode (48kHz devices): 40 input 20+40(ME) output channels		
dx mode (96kHz devices): 32 input 32 output channels		
gigaACE/GX (96kHz devices) :128 input 128 output channels		
Inputs: Fully patchable		
Outputs: Fully patchable		
Sync/SRC: Assignable as master audio sync for all modes, SRC 64 channel		
I/O Port: equivalent to followings or superior		
Inputs: Fully patchable		
Outputs: Fully patchable		
Sync/SRC: Assignable as master audio sync		
System: equivalent to followings or superior		
Dynamic range 112dB		
Frequency response +0/-0.5dB 20Hz to 20kHz		
Headroom +18dB		
Internal operating Level: 0dBu		
THD+N, Mic/Line routed to Main L/R Out: Unity gain faders@0dB, 0.006%, -84dBu (20 - 20kHz)		
dBFS alignment: +18dBu = 0dBFS (+22dBu at XLR output)		
Meter calibration: 0dB meter = -18dBFS (+4dBu at XLR out)		
Main meter type: 2 x 12 segment, fast (peak) response		
Channel meter type: Chromatic channel metering, fully programmable color/brightness		
Peak indication: -3dBFS (+19dBu at XLR out), multi-point sensing		
Sampling rate: 96kHz		
Bit depth: Uses XCVI core custom bit widths in algorithms, up to 96bits		
Latency: 0.7mS, local mic input to main L/R		
Control: equivalent to followings or superior		
Faders: 100mm motorized		
Touch screen: 7" capacitive, 800 x 480 resolution, 24 bit RGB		
SoftKeys: 8		
Mute Groups / DCA Groups: 8 / 8		
Network: TCP/IP Ethernet for MIDI and Control		
MIDI: TCP/IP and USB-B		
Footswitch: Single or Dual, Momentary or Latching		
Input Processing: equivalent to followings or superior		
Source		
CH1-48: Fully patchable		
USB global source: SQ-Drive or USB B streaming		
Polarity: Normal/Invert		
Trim: -24 to +24dB		
High pass filter: 12/18/24dB per octave 20Hz – 2kHz		
Insert (Pre EQ/Comp): Fully patchable		
Delay: Up to 341ms		
Gate: Patchable sidechain		
Sidechain filter: Hi-pass (20-5k), band-pass (120-10k), Lo-pass (120-20k)		
Threshold / depth: -72dBu to +18dBu / 0 to 60dB		
Attack / hold / release: 50μs to 300ms / 10ms to 5s / 10ms to 1s		
PEQ: 4-Band fully parametric, 20-20kHz, +/-15dB		
Band 1, Band: 4 Selectable shelving (Baxandall), Bell, HPF/LPF 12dB/octave		
Band 2, Band 3: Bell		
Bell width: Variable Q, 1.5 to 1/9th octave		
Compressor: Patchable sidechain, DEEP options		
Sidechain filter: Hi-pass (20-5k), band-pass (120-10k), Lo-pass (120-20k), Q=1		
Threshold / ratio: -46dBu to 18dBu / 1:1 to infinity		
Attack / release: 30μs to 300ms / 50ms to 2s		
Knee: Soft/Hard		
Detector response: Peak/RMS switchable		
Parallel path compression: dry/wet -infin to 0dB		
Channel direct out: Follow Fader, Mute, Mute Group, DCA (global all ch)		
Source select: Post-Preamp, Post-HPF, Post-Gate, Insert Return,		
Post-PEQ, Post-Comp, Post-Delay		
trim -infin to 10dB per channel		
Mix Processing: equivalent to followings or superior		
Insert (Pre EQ/Comp)0: Fully patchable		
Delay: Up to 682ms		
GEQ: 28 bands 31Hz-16kHz, +/-12dB Gain, Constant 1/3 oct, DEEP options		
PEQ: As Input PEQ		
Compressor: As Input Compressor		

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Technical Specifications	Reference brand	Quantity	
FX: equivalent to followings or superior			
Internal FX: 8 x RackFX engine, Send>Return or Inserted (4 dedicated fx bus)			
Types: SMR Reverb, Stereo Tap Delay, Gated Reverb, ADT, Blue Chorus			
Symphonic Chorus, Flanger, Phaser			
8 dedicated Stereo FX returns: Fader, Pan, Mute, Routing to Mix/LR, 4-Band PEQ			
Audio Tools: equivalent to followings or superior			
PAFL: PFL or stereo in-place AFL, 0 to -24dB Trim, PAFL Delay Up to 682ms			
Talkback: Dedicated input, Assignable to any mix, Gain, Pad, 48V, 12dB/oct HPF			
Signal generator: Assignable to any input or mix, Sine/White/Pink/Bandpass Noise			
RTA's: 2x 31-Band 1/3 octave (Stereo) or 61-Band 1/6 octave (Mono) 20-20kHz.			
PAFL/Selected Channel or Fixed Source			
USB Audio: equivalent to followings or superior			
SQ-Drive: USB-A			
Stereo Record: 2 channel, WAV, 96kHz, 24-bit, source fully patchable			
Stereo Playback: 1/2 channel, WAV, 44.1, 48, 96kHz 16,24-bit, source fully patchable			
Multitrack Record: 1-16 channel 96kHz, 1-32 channel 48kHz, 24-bit, WAV, fully patchable			
Multitrack Playback: 1-16 channel 96kHz, 1-32 channel 48kHz, 24-bit, WAV, fully patchable			
USB Audio Streaming: USB-B, Core Audio compliant, ASIO/WDM for Windows			
Send (upstream): 32 channel, 48/96kHz, 24-bit			
Return (downstream): 32 channel, 48/96kHz, 24-bit			
AMMs: equivalent to followings or superior			
Configuration: 2x 24ch or 1x 48ch, freely assignable			
Type: Gain sharing			
Sidechain filter HPF / LPF: 12dB/octave 20Hz – 5kHz / 120Hz - 20kHz			
Priority: -15dB to +15dB per channel			
Add-ons: equivalent to followings or superior			
DEEP Preamps: Tube Stage			
DEEP Compressors: Opto, 16T, 16VU, PeakLimiter76, Mighty			
DEEP GEQ's: Proportional-Q, DiGi-GEQ, Hybrid			
RackFX units: De-Esser, DynEQ4, MultiBD3, MultiBD4, Bucket Brigade, Echo, Hypabass			
Operating temperature range: 0 to 40°C or wider			
Dimensions:			
Depth: 515mm or less			
Width: 440mm or less			
Height: 200mm or less			
Weight: 10.5kg or less			
Power supply: 100-240VAC 50/60Hz			
Power consumption: 75W or less			
Accessories: Manufacturer standard accessories			
4.1.2 Dust Cover	Allen&Heath	AP11332	1
Specification			
Use: dust cover for 4.1.1 Digital Mixer			
4.1.3 Option Module	Allen&Heath	M-SQ-DANT64-AX	1
Specification			
Dante Multi-channel I/O option module			
Inputs: Fully Patchable			
Outputs: Fully Patchable			
Sync/SRC: Assignable as master audio sync			
64x64 channels at 48/96kHz			
Redundant network connections			
DDM supported			
AES67 compatible			
Compatible with all 48/96kHz Dante devices			
Audio over L3 Ethernet Cat5e or higher			
Sample accurate playback sync			
Up to 64x64 channels of virtual soundcard			
4.1.4 Digital Stage Box	Allen&Heath	AB1608/220X	1
Specification			
16 XLR mic / line inputs			
8 XLR line outputs (L/R)			
Phantom power LED			
Expendier port			
XLR Mic/Line inputs: Balanced			
Mic/Line Preamp: Fully recallable			
Input sensitivity: -60 to +15dBu or wider			
Analogue gain: +5 to +60dB or wider, 1dB steps			
Pad: including -20dB			
Maximum input level: +32dBu or more			
Input impedance: 4kΩ or more (Pad out) , 10kΩ or more (Pad in)			
XLR Outputs: Balanced, relay protected			
Output impedance: 75Ω typical			
Nominal output: +4dBu = 0dB meter reading			
Maximum output level: +22dBu or more			
Residual output noise: -91dBu (muted, 20-20kHz) or less			
Operating temperature range: 5 to 35°C or wider			
Dimensions:			
Depth: 190mm or less			
Width: 390mm or less			
Height: 190mm or less			
Weight: 4.8kg or less			
Power supply: 100-240VAC 50/60Hz			
Power consumption: 40W or less			
Accessories: Manufacturer standard accessories			
4.1.5 Carry Bag	Allen&Heath	AP9932	1
Specification			
Use: carry bag for 4.1.4 Digital Stage Box			
4.1.6 Dante MADi Converter	DirectOut	EXBOX.MD Rev. 2.0	1
Specification			
Type: 64ch Dante / MADi Converter with FastSRC and EARS Interfaces			
MADi ports (I/O): 1 x coaxial BNC, 75Ω			
1 x optical SC-Socket multi-mode			
1 x SFP (empty cage without module)			
Network:3 x RJ45 Socket (1Gbit/s) 1 x RJ45 Socket (1Gbit/s, PoE)			
Sample rates:44.1, 48, 88.2, 96, 176.4, 192kHz (+/- 12,5%)			
MADi formats: 48k / 96k Frame, 56 / 64 channel, S/MUX			

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Technical Specifications	Reference brand	Quantity
Network-Layer: 3		
Number of streams: 32		
Number of channels (I/O): 64 (@1 FS), 32 (@2 FS), 16 (@4 FS)		
Network standard: Dante, AES67		
Dimensions:		
Depth: 140mm or less		
Width: 140mm or less		
Height: 42mm or less		
Weight: 0.8kg or less		
Power Supply: DC 9 - 24V, 1 x PoE		
4.1.7 SFP Transceiver	DirectOut	SFP MADI Transceiver MM
Specification		1
SFP MADI Transceiver, LC duplex connector, 1310nm, Multi Mode, up to 2000 m		
Use: for 4.1.6 Dante MADI Converter		
4.1.8 UTP Cable with Reel	Broadcast Solutions	custom build
Specification		1
Cable: UTP CAT6A or superior		
Cable length: 100 m		
Outer drum diameter: 300mm or smaller		
Outer drum depth: 150mm or smaller		
Cable drum material: Plastic		
Weight: 8kg or less		
4.1.9 Power Cable with Drum	Varytec	391455
Specification		1
Cable: H07RN-F 3x 1.5mm ² or equivalent		
Cable length: 50 m		
Ingress Protection (Plug & Socket): IP44		
Outer drum diameter: 300mm or smaller		
Outer drum depth: 150mm or smaller		
Cable drum material: Plastic		
Weight: 9kg or less		
4.2 SPEAKER & CONTROL		
4.2.1 Active Speaker	Fostex	6301NB
Specification		2
Speaker		
Enclosure type: Closed		
Unit: 10cm full range speaker		
Frequency response: 70Hz to 15KHz or wider		
Sound Pressure Level: 85dB / W (1m)		
Maximum SPL: 98dB		
Amplifier		
Input: Unbalanced 6.3 mm jack input		
Rated output: 20W or more		
Distortion (T.H.D.): 0.05% (1kHz / 1W output) or better		
Residual Noise: -70dBV or less		
Input Sensitivity: -14dBV (0.2Vr.m.s.) or better		
Input impedance: 10kΩ or more		
Operating temperature range: -10 to 50°C or wider		
Operating humidity range (non condensing): 0% to 90% or wider		
Dimensions:		
Depth: 120mm or less		
Width: 120mm or less		
Height: 190mm or less		
Weight: 2.2kg or less		
Power supply: 100-240VAC 50/60Hz		
Power consumption: 10W or less		
Accessories: Manufacturer standard accessories		
4.2.2 Monitor Controller	Sonifex	RM-MC1L
Specification		1
Type: Monitor controller, single stereo input with light control		
Input		
Input impedance: 20kΩ or more		
Maximum input level: +25dBu		
Output impedance: 50Ω or more		
Maximum output level: +25dBu or more		
Attenuation range: 86dB or more		
DIM attenuation range: Adjustable, -3dB to -23dB or wider		
Common mode rejection: 66dB typical		
Distortion: 0.04% or less, ref +8dBu		
Crosstalk: -80dB or less @ 1kHz input, ref 0dBu		
Front Panel Operation Controls: including followings		
Light control (All units): Transmit (TX), Standby & Rehearse (REH) illuminated buttons		
Audio controls: Dim & Cut illuminated buttons		
Volume control: Rotary potentiometer for output attenuation on front panel		
Rear Panel Connections: including followings		
Audio inputs: 2 x XLR 3-pin female (balanced)		
Audio outputs: 2 x XLR 3-pin male (balanced)		
Remote I/O port: 15 way D-type socket		
Mains Input: 1x AC		
Dimensions:		
Depth: 110mm or less		
Width: 480mm or less		
Height: 43mm or less		
Weight: 1.3kg or less		
Power supply: 86-264VAC 50/60Hz		
Accessories: Manufacturer standard accessories		

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Technical Specifications	Reference brand		Quantity
4.3 INTERCOM			
4.3.1 Intercom Main Station	RTS	OMS DIGITAL INTERMED 4F	1
Specification			
4-wire Analog: including followings			
Connectors: 4 x RJ-45 connectors			
Signal format: Differential RX/TX audio with differential RS-485 control data			
A/D and D/A resolution: 24bits			
Max input level (balanced): 20 dBu w/o clipping			
Digital input gain: Programmable (-20dB - 20 dB)			
Input frequency response: . +1dB/-3dB from 100Hz to 20kHz			
THD+N (8dBu input, unity gain): 0.025% or less non-weighted@1kHz			
0.075% or less non-weighted, 100Hz – 20kHz			
Nominal input impedance: 22kΩ or more			
Nominal output level: 8 dBu			
Digital output gain: Programmable: (-20dB – 20dB)			
Maximum Output Level (balanced): 20dBu w/o clipping			
Output frequency response: +1dB / -3dB from 100Hz to 20kHz			
Output noise floor: -65dBu or less			
Crosstalk isolation: 80dB or more			
PGM1 & PGM2: 3-pin XLR-F			
Signal format: Differential RX/TX audio			
A/D resolution: 24bits			
Max input level (balanced): +20dBu w/o clipping			
Digital input gain: Programmable (-20dB - 20 dB)			
Input frequency response: . +1dB/-3dB from 100Hz to 20kHz			
THD+N (8dBu input, unity gain): 0.025% or less non-weighted@1kHz			
0.075% or less non-weighted, 100Hz – 20kHz			
Nominal input impedance: 22kΩ or more			
Nominal output level: 8 dBu			
Digital output gain: Programmable: (-20dB – 20dB)			
SA (Stage Announce) (output) 3-pin XLR-M			
Signal format: Differential RX/TX audio			
D/A resolution: 24bits			
Maximum Output Level (balanced): 20dBu w/o clipping			
Digital output gain: Programmable: (-20dB – 20dB)			
Maximum Output Level (balanced): 20dBu w/o clipping			
Output frequency response: +1dB / -3dB from 100Hz to 20kHz			
Output noise floor: -65dBu or less			
Crosstalk isolation: 80dB or more			
2-Wire Party Line Analog:			
Connector: 4 x 3-pin female XLR connectors			
4W/2W echo return loss: 45dB or more			
Expected termination impedance: 200 Ω			
Noise contribution: -70dBu or less			
THD+N (w/ nominal input): 0.5% or less , 200Hz – 7.3kHz			
Bridging impedance: 10kΩ or more			
CALL signaling: 20kHz			
MIC KILL Signaling: 24 kHz			
Balanced Operation			
Expected termination impedance: 300Ω			
Noise Contribution: -70 dBu or less			
THD+N (w/ nominal input): 0.5% or less , 200Hz – 7.3kHz			
Bridging impedance: 10kΩ or more			
CALL signaling: 20kHz			
MIC KILL Signaling: 24kHz			
General Purpose Input/Output Ports:			
Relays (4 Relays)			
Type: SPDT			
Contacts:			
Common (C)			
Normally closed (NC)			
Normally open (NO)			
Contact Rating: 1A @ 48VDC			
Inputs (4 Inputs)			
Type: Optically coupled			
Input voltage: 5VDC – 12VDC			
Control Port:			
Connector: RJ-45			
Format: IEEE 802.3 compliant			
Speed: 10/100/1000Mbps			
LEDs: Speed and link/activity			
Network (primary and secondary):			
Copper connector type: RJ-45			
Format: IEEE 802.3 compliant			
Copper Ethernet speed: 100/1000 Mbps			
Fiber connector type: SFP			
Multi mode: 500m / 2.125Gbps			
Single mode: 15km / 2.67Gbps			
TFT Display:			
Active area: 120.10 mm (wide) x 18.77 mm (high)			
Dot resolution: 576 x 90 pixels			
Color resolution: 16-bit (64K) RGB color			
Headset connector: A4F			
Operating temperature range: 0 to 45°C or wider			
Dimensions:			
Depth: 200mm or less			
Width: 483mm or less			
Height: 44mm or less			
Weight: 2.4kg or less			
Power supply: 100-240VAC 50/60Hz			
Power consumption: 30W or less			
Accessories: Manufacturer standard accessories			
4.3.2 Key Panel	RTS	KP-3016 A4F	2
Specification			
Type: 16 keys Color Display Key Panel			
LCD Display:			
Active area: 120.10 mm (wide) x 18.77 mm (high)			
Dot resolution: 576 x 90 pixels			
Color resolution: 16-bit (64K) RGB color			

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Technical Specifications	Reference brand	Quantity	
Input; including followings			
Matrix			
Type: Balanced			
Typical input level:+8dBu			
Typical input impedance: 10kΩ or more			
Maximum input level: +20dBu			
Supported bandwidth: 100Hz to 20KHz			
Panel Microphone			
Type: Electret			
Typical input level: -42dBu			
Typical input impedance: 1kΩ			
Maximum input level: -25dBu			
Headset Microphone: Electret			
Typical input level: -42dBu			
Typical input impedance: 1kΩ			
Maximum input level: -25dBu			
Headset Mic - Dynamic			
Typical input level -50dBu			
Typical input impedance: 600Ω			
Maximum input level: -25dBu			
Headset connector: A4F			
Output: including followings			
Matrix			
Type: Balanced			
Typical output level:+8dBu			
THD+N%: 0.20% or less			
Typical output impedance: 600Ω			
Maximum output level: +20dBu			
Headset			
Maximum output power: 125mW for 32Ω load			
Earphone impedance: 16Ω and above			
THD+N%: 0.20% or less			
Speaker			
SPL: 84dB SPL or more for 1kHz sine wave @ 1 meter			
Digital Channel			
Typical latency: 1ms			
Frequency response; 20Hz - 20kHz			
Operating temperature range: 0 to 55°C or wider			
Dimensions:			
Depth: 100mm or less			
Width: 483mm or less			
Height: 44mm or less			
Weight: 1.6kg or less			
Power supply: 100-240VAC 50/60Hz (AC Adapter is accepted)			
Power consumption: 13W or less			
Accessories: Manufacturer standard accessories			
4.3.3 Microphone	RTS	MCP-90-12	3
Specification			
Generation element: Condenser, back-Electret			
Frequency response: 100Hz to 15,000Hz			
Polar pattern: Cardioid			
Open circuit voltage: 4.5mV (-47dB)/Pascal @ 1kHz			
Dynamic range: 102dB			
Power requirements: 1.5 to 9VDC			
Knurled stem to head length: approx. 305 mm			
Panel Microphone Connector Type: TRS, ¼ " phone jack with threaded female metal bushing			
Accessories: Manufacturer standard accessories			
4.3.4 Dynamic Microphone	RTS	LH-300-DM-A4M	3
Specification			
Headphone: including followings			
Type: Dynamic			
Impedance: 300Ω			
Frequency response: 200Hz – 10kHz (-10dB ref. 1 kHz)			
Sensitivity: 100 ± 4dB SPL @ 1kHz & 1mW			
Microphone			
Element type: Noise-Canceling Dynamic			
Impedance: 300Ω			
Frequency response: 200Hz – 6.5kHz (-10dB ref. 1 kHz)			
Sensitivity: -63 ± 3.5dB ref: 1 V/Pa @ 1 kHz			
Connector type: A4M			
Accessories: Manufacturer standard accessories			
4.3.5 Universal Interface	RTS	OEI-2	2
Specification			
Connections: including followings			
2 x RJ-45 Ethernet connectors			
1 x SFP Fiber connector (LC type)			
GPI-1 (General Purpose Input)			
Type: Optically coupled			
Input: Internal pull-up resistor to 5 VDC			
External power source: 5-18VDC			
GPI-2			
Type: DPDT Relays with common, normal-open and normal-closed contacts			
Contact ratings: 1.0Amp @ 30VDC			
Data Keypanel: RS485			
Analog: including followings			
Input			
Type: Balanced floating			
Level nominal: 8dBu			
Level maximum: 20dBu			
Impedance: 10kΩ			
Output			
Type: Balanced floating			
Level nominal: 8dBu			
Level maximum: 20dBu			
Impedance: 600Ω			
THD+Noise: 0.1% or less (measured at 20-20kHz, +0dBu, unity gain)			
Digital: including followings			

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Technical Specifications	Reference brand		Quantity
Audio			
Frequency response: 20Hz to 20kHz; ±0.1dB			
System Gain: 0dB			
Bandwidth			
48kHz/24-bit per channel: 2.59 Mbits/s			
Latency: 20ms			
Operating temperature range: 0 to 55°C or wider			
Dimensions:			
Depth: 115mm or less			
Width: 150mm or less			
Height: 50mm or less			
Weight: 0.7kg or less			
Power supply: 100-240VAC 50/60Hz (AC Adapter is accepted)			
Power consumption: 20W or less			
Accessories: Manufacturer standard accessories			
4.3.6 Mixer	ART	MX821S	2
Specification			
Type: 8 Ch Mic / Line Audio Mixer			
Input Connections: including followings			
XLR female balanced (Mic, channels 1-8)			
1/4-inch TS unbalanced (Line, channels 1-8)			
RCA unbalanced (Aux Bus In, Left and Right)			
Output Connections: including followings			
1/4-inch TRS balanced (Main Outputs, Left and Right)			
RCA unbalanced (Prefade Out, Left and Right)			
Input impedance: 2kΩ (Mic), 20kΩ (Line), 51kΩ (Aux Bus In)			
Output impedance: 200Ω (Main Outputs, balanced), 100 Ω (Prefade Out)			
Frequency response: 20Hz – 20kHz (+0, -1 dB) (CH 1-8 in, Main out)			
THD: 0.01% or less @ 1 kHz, typical			
Phase response: All connections shall be phase coherent			
Signal to noise ratio: 99dB or better (Ref 0dBu)			
CMRR: 43dB or more			
Maximum input level: -4dBu (Mic), +22dBu (Line) or more			
Maximum output level: +24dBu (balanced), +18dBu (unbalanced) or more			
Maximum gain: 54dB (Mic), 29dB (Line) or more			
Phantom Power: Switch selectable, +48V DC (regulated and filtered), 7 mA current limiting per leg			
Dimensions:			
Depth: 160mm or less			
Width: 483mm or less			
Height: 45mm or less			
Weight: 3kg or less			
Power supply: 100-240VAC 50/60Hz			
Power consumption: 15W or less			
Accessories: Manufacturer standard accessories			
4.3.7 Distribution Amplifier	sonifex	RB-DA6G	1
Specification			
Maximum input level:+28dBu or more			
Maximum output level:+28dBu or more			
Frequency response: 20Hz to 20kHz ±0.1dB (600Ω load, ref 1kHz)			
Gain range: Adjustable 8dB loss to 18dB gain (12 adjustable pots)			
Common mode rejection: 66dB typical			
Input impedance: 20kΩ bridging or more			
Output impedance: 50Ω or less			
Distortion: 0.01% THD @ 1kHz, ref +8dBu output			
Noise: -88dB unity gain, ref +8dBu output			
Connections: including followings			
Inputs: 2 x XLR 3 pin female (balanced, can be unbalanced)			
Outputs: 12 x XLR 3 pin male (balanced, can be unbalanced)			
Dimensions:			
Depth: 108mm or less			
Width: 480mm or less			
Height: 42mm or less			
Weight: 1.9kg or less			
Power supply: 220-240VAC 50/60Hz			
Power consumption: 6W or less			
Accessories: Manufacturer standard accessories			
4.4 COMMENTARY PANEL			
4.4.1 Commentary Unit (Customer Supplied)	GlenSound	Express ip MINI	1
Compact 2 User Dante/ AES67 Commentary Unit			
4.4.2 Stereoheadset	AUDIO-TECHNICA	BPHS1	2
Stereoheadset m. dyn. Mikrofon 3pol-XLR/6,3mm			
4.4.3 Monitor (Customer Supplied)	Customer Supplied	Customer Supplied	1
Monitor 24", FHD, HDMI input			
4.4.4 HDMI/SDI Cross Converter for 3G/HD/SD	Decimator Design	MD-LX	1
INPUTS 1 x HDMI Type A 1 x (3G/HD/SD)-SDI Micro USB for power, control and firmware updates			
OUTPUTS 1 x HDMI Type A 1 x (3G/HD/SD)-SDI			

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Technical Specifications	Reference brand		Quantity
SDI FORMATS 3G-A or 3G-B:SMPTE 424M@2.97 and 2.967Gb/s 1080p@60/59.94/50Hz HD:SMPTE 292M/274M/296M@1.485 and 1.435Gb/s 1080i@60/59.94/50Hz/1080p/psf@30/29.97/25/24/23.98Hz 720p@60/59.94/50/30/29.97/25/24/23.98Hz SD:SMPTE 259M@270Mb/s 625i50 (PAL) 525i59.94 (NTSC) HDMI FORMATS 1080p@60/59.94/50/30/29.97/25/24/23.98Hz 1080i@60/59.94/50Hz 720p@60/59.94/50/30/29.97/25 625i50 (PAL) 525i59.94 (NTSC) POWER: USB Power DIMENSIONS: 60mm x 73.7mm x 23mm			
4.4.5 Flightcase for commentary equipment	Broadcast Solutions	custom build	1
4.4.6 Cable 50 Meter coaxial cable and 50 Meters CAT6 cables on Reel	Broadcast Solutions	custom made	1
4.4.7 Cable The 50 m long earthed cable drum with IP44 plug and sockets	Varytec	391455	1
4.5 TELEPHONE HYBRID			
4.5.1 Telephone Hybrid	AVT	802015	1
Specification			
Features: including followings			
1 Channel with 1 Hybrid, AGC, Echo-Canceller			
1 x LAN (control, optional VoIP), 1 x POTS (optional)			
Either VoIP, POTS or both can be equipped			
1 x Phone			
2 x Analogue Audio			
Web browser control & configuration			
Line interface: including followings			
POTS (optional): 1 x POTS RJ12			
LAN: 1 x LAN, RJ45			
Pretalk interface: including followings			
Telephone: 1 x PHONE, RJ12			
Control Interface: including followings			
LAN: RJ45 (same as line interface)			
TTL/RELAY: SUB-D socket			
2 x Relay: function can be programmed			
Capacity: 48V/200mA			
4x TTL Input/Output: function can be programmed			
Capacity: 3.3V/10mA			
Audio Interface: including followings			
Analogue Audio:			
Electronically balanced input: XLR female			
Electronically balanced input: XLR male			
Nominal level: -3 to +9dBu (can be programmed)			
Head room: 0 to 15dB (can be programmed)			
Input impedance: 25kΩ or more			
Output impedance: 50Ω			
Frequency response: 50Hz to 7kHz			
Signal to noise ratio: 80 dB or more			
Noise: -92dB or less			
Signal Processing including followings			
AGC per channel: configurable			
Level adjustment control during connection: -16dB to +16dB			
Echo canceller per channel: 100 ms echo cancelling time			
Expander per channel: configurable			
Display including followings			
Graphical resolution: 160 x 32 Pixels			
Illuminated: can be switched off			
Operating temperature range: 5 to 45°C or wider			
Operating humidity range (non condensing): 5% to 85% or wider			
Dimensions:			
Depth: 220mm or less			
Width: 220mm or less			
Height: 45mm or less			
Weight: 1.7kg or less			
Power supply: 100-240VAC 50/60Hz (AC Adapter is accepted)			
Power consumption: 15W or less			
Accessories: Manufacturer standard accessories			
4.5.2 POTS Option	AVT	430641	1
Specification			
Use: POTS Option for 4.5.1 Telephone Hybrid			
4.5.3 GSM Adapter	AVT	490135	1
Specification			
Analogue telephone line: including followings			
Telephone interface: 2-wires			
Telephone connector : RJ 11			
Impedance : 600Ω ± 20%			
Dial tone: DTMF			
Supply conduction: 24V			
Current loop: max 29mA			
Resistance of subscribers conduction: max. 500Ω			
Ringing: 55Vef / 50Hz			
Signalization: 425Hz ±20Hz			
GSM:			
Mobile network: Quad-Band 850/900/1800/1900Mhz			
Provider: according SIM card (3V and 1.8 V)			
USB: version 1.1, virtual COM			
Operating temperature range: -20 to 40°C or wider			

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Technical Specifications	Reference brand		Quantity
Operating humidity range (non condensing): 10% to 80% or wider			
Dimensions:			
Depth: 130mm or less			
Width: 100mm or less			
Height: 37mm or less			
Power supply: 100-240VAC 50/60Hz (AC Adapter is accepted)			
Accessories: Manufacturer standard accessories			
4.6 MICROPHONE & ACCESSORIES			
4.6.1 Shotgun Microphone	Sennheiser	MKH 416 P 48	6
Specification			
Type: Short shotgun microphone			
Frequency response (Microphone): 40 - 20kHz or wider			
Transducer principle (Microphone): RF condenser microphone			
Pick-up pattern: super-cardioid/lobar			
Sensitivity in free field, no load (1kHz): 5 mV/Pa +- 1dB or better			
Nominal impedance: 25Ω			
Min. terminating impedance: 800Ω			
Equivalent noise level:			
A-weighted (DIN IEC 651): approx. 13dB			
ITU-R weighted (ITU-R 468): approx. 24dB			
Maximum sound pressure level: 130 dB or more at 1kHz			
Power supply phantom: 48 ± 12 V			
Supply current: 2mA			
Dimensions: Ø 19 x 250 mm or smaller			
Weight: approx. 165g			
Accessories: Manufacturer standard accessories			
4.6.2 Microphone Grip/Stand	Sennheiser	MZS 20-1	6
Specification			
Type: Pistol grip for use with 4.5.1 Shotgun Microphone			
4.6.3 Wind Muff	Sennheiser	MZH 60-1	6
Specification			
Type: Hairy cover made from long-haired polyester fleece provides maximum protection against wind noise			
Use : for use with 4.5.1 Shotgun Microphone			
4.6.4 Windscreen	Sennheiser	MZW 60-1	6
Specification			
Lightweight, rugged protective basket windshield provides excellent suppression of wind noise when used for outdoor applications.			
Length: approx. 44 cm.			
Use : for use with 4.5.1 Shotgun Microphone			
4.6.5 Dynamic Microphone	Sennheiser	e 835 S	2
Specification			
Transducer principle: dynamic			
Frequency response: 40 to 16kHz or wider			
Pick-up pattern: cardioid			
Sensitivity (free field, at 1kHz): 2.7 mV/Pa			
Nominal impedance (at 1kHz): 350Ω			
Min. terminating impedance: 1 kΩ			
Connector: XLR-3			
Operating temperature range: 0 °C to 40 °C or wider			
Dimensions Ø 48 x 180mm or smaller			
Weight 330g or less			
Accessories: Manufacturer standard accessories			
4.6.6 Microphone Stand	K&M	210/9 Black	2
Specification			
Boom arm: 2-piece telescopic design			
Boom arm clamping: T-bar locking screw			
Boom arm length: from 435 to 745mm or wider			
Height: from 900 to 1,605mm or wider			
Height adjustment: Clutch			
Leg construction: Socket with foldable legs			
Material: Steel			
Rod combination: 2-piece folding design			
Size when folded: 105 x 85 x 985mm			
Threaded connector: 3/8"			
Type: black			
Weight: 3.1kg or similar			
Accessories: Manufacturer standard accessories			
4.6.7 Microphone Stand	K&M	25910 Black	6
Specification			
Boom arm: one-piece design			
Boom arm clamping: T-bar locking screw			
Boom arm length: 525mm or similar			
Height: 280mm or similar			
Leg construction : Socket with foldable legs			
Material : steel			
Threaded connector: 3/8"			
Type: black			
Weight: 1.9kg or similar			
Accessories: Manufacturer standard accessories			
4.6.8 Microphone Cable	the sssnake	SM10BK	20
Specification			
Cable diameter: approx. 6mm			
Wire cross-section: 2 x 0.22mm ²			
Color: Black			
Cable length: 10 m			
Connector 1 XLR 3-pol female			
Connector 2 XLR 3-pol male			
4.6.9 Microphone Cable with Drum	Broadcast Solutions	12894	4
Specification			
Cable diameter: approx. 6mm			

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Technical Specifications	Reference brand		Quantity
Wire cross-section: 2 x 0.22mm ²			
Color: Black			
Cable length: 100 m			
Connector 1 XLR 3-pol female			
Connector 2 XLR 3-pol male			
Outer drum diameter: 300mm or smaller			
Outer drum depth: 150mm or smaller			
Cable drum material: Plastic			
Weight: 8kg or less			
4.7 WIRELESS MIC & IEM			
4.7.1 Wireless Lavalier Microphone	Sennheiser	EW-D ME2 SET (R1-6)	2
Specification			
System			
Audio link frequency range: 520 - 576MHz			
Bluetooth Low Energy (BLE) frequency range: 2402 - 2480MHz			
Audio frequency response: 20Hz - 20kHz (-3dB) at 3dBfs			
Audio THD: -60dB or less for 1 kHz at 3dBfs input level			
Dynamic range: 134dB or more			
System latency: 1.9ms or less			
Operating temperature range: -10 °C - +55 °C or wider			
Relative humidity: 5 - 95 % (non-condensing) or wider			
Rack Receiver			
Input voltage: 11 - 13VDC or wider			
Input current: 300mA or less			
Transmit power (radiated) BLE: max. 10mW EIRP			
Audio output power: 18dBu max.			
Dimensions:			
Depth: 190mm or less			
Width: 220mm or less			
Height: 44mm or less			
Weight: approx. 1kg			
Bodypack Transmitter			
Input voltage: 2.0 - 4.35V or wider			
Input current: 300mA or less			
Power supply: 2 x AA batteries 1.5V (alkali manganese) or BA 70 rechargeable battery pack			
Occupied bandwidth: 200kHz			
Transmit power (radiated):			
Audio link: 10mW ERP			
BLE: max. 10mW EIRP			
Dimensions (without antenna):			
Depth: 20mm or less			
Width: 65mm or less			
Height: 80mm or less			
Weight (without batteries): approx. 120g			
Lavalier Microphone			
Transducer principle: Pre-polarized condenser microphone			
Pick-up pattern: Omni-directional			
Sensitivity (free field, no load) (1kHz): 17mV/Pa or better			
Max. SPL at 1kHz: 130dB or more			
Frequency response: 50 to 18kHz or wider			
Equivalent noise level (A-weighted): 32dB or less			
Connector: 3.5mm jack			
Cable length: approx. 1.6m			
Supply voltage: 7.5V			
Accessories: Manufacturer standard accessories			
4.7.2 Wireless stereo IEM Set	Sennheiser	XSW IEM SET	1
Specification			
Stereo Transmitter			
RF characteristics			
Modulation: FM stereo			
Frequency range: 572 - 596MHz			
Max. RF output power: 30mW			
Switching bandwidth: up to 24MHz			
Nominal/peak deviation: ±15kHz / ±24kHz			
Antenna output: BNC socket, 50Ω			
AF characteristics			
AF frequency response: 45Hz to 15kHz or wider			
AF input: 2x XLR-3/4" (6.3 mm) jack, balanced, combo socket, or equivalent			
Total harmonic distortion (THD): 0.9% or less			
Signal-to-noise ratio (at nominal load and peak deviation): 88dB or more			
Operating temperature range: 0 to 40°C or wider			
Dimensions:			
Depth: 130mm or less			
Width: 200mm or less			
Height: 45mm or less			
Power supply: 12VDC			
Weight: 0.8kg or less			
Accessories: Manufacturer standard accessories			
Stereo Receiver			
RF characteristics			
Modulation Wideband: FM			
Frequency ranges: 572 - 596MHz			
Switching bandwidth: up to 24MHz			
Nominal/peak deviation: ±15kHz / ±24kHz			
Squelch: 10μV, fixed			
AF characteristics			
Signal-to-noise ratio (1mV, peak deviation): 88dB or more			
Total harmonic distortion (THD): 1% or less			
AF output level at 3.5mm: 2 x 1,25Veff at 16Ω or similar			
High Boost (EQ): +10dB at 13kHz or similar			
Limiter: -10dB or similar			
AF frequency response: 45Hz to 15kHz or wider			
Cross talk (50Hz - 10kHz): approx. 45dB			
Operating temperature range: 0 to 40°C or wider			
Dimensions:			
Depth: 30mm or less			
Width: 70mm or less			
Height: 95mm or less			

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Technical Specifications	Reference brand	Quantity	
Power supply: 2 x AA batteries 1.5v			
Nominal voltage: 3V battery			
Weight: 110g or less			
Accessories: Manufacturer standard accessories			
In-ear headphones			
Transducer: dynamic			
Frequency response: 40 to 20kHz or wider			
SPL (1 kHz, 1 mW): 106dB or more			
Nominal impedance: 6Ω			
Cable length: approx. 1.4m			
Connector: 3.5mm (1/8") stereo plug, gold-plated			
Operating temperature range: -5 to 50°C or wider			
4.7.3 Additional Stereo IEM Receiver	Sennheiser	XSW IEM EK	1
Specification			
Stereo Receiver			
RF characteristics			
Modulation Wideband: FM			
Frequency ranges: 572 - 596MHz			
Switching bandwidth: up to 24MHz			
Nominal/peak deviation: ±15kHz / ±24kHz			
Squelch: 10μV, fixed			
AF characteristics			
Signal-to-noise ratio (1mV, peak deviation): 88dB or more			
Total harmonic distortion (THD): 1% or less			
AF output level at 3.5mm: 2 x 1,25Veff at 16Ω or similar			
High Boost (EQ): +10dB at 13kHz or similar			
Limiter: -10dB or similar			
AF frequency response: 45Hz to 15kHz or wider			
Cross talk (50Hz - 10kHz): approx. 45dB			
Operating temperature range: 0 to 40°C or wider			
Dimensions:			
Depth: 30mm or less			
Width: 70mm or less			
Height: 95mm or less			
Power supply: 2 x AA batteries 1.5v			
Nominal voltage: 3V battery			
Weight: 110g or less			
Accessories: Manufacturer standard accessories			
4.7.4 Flight Case for wireless Receiver/Transmitter Mic STB	Broadcast Solutions	custom build	1
Specification			
Use: for transportation of Wireless Receiver/Transmitter Mic STB			
Durability : shall be strong enough in harsh environment			
Size/shape/composition: to be proposed			
4.7.5 Connection Panel	Broadcast Solutions	custom build	1
Specification			
Configuration			
Number of Conductors: 3			
Gender: Male/Female			
Termination Style: Feedthru			
Contact Plating: Silver			
Locking: Locking			
Packaging Type: Box			
Number of Stations: 16			
Standard Connector Type: XLR			
Wired: 1			
Front Connector: XLR Male			
Rear Connector: XLR Female			
Jack Layout: 1x16			
4.7.6 Power Cable with Drum	Varytec	391455	1
Specification			
Cable: H07RN-F 3x 1.5mm ² or equivalent			
Cable length: 50 m			
Ingress Protection (Plug & Socket): IP44			
Outer drum diameter: 300mm or smaller			
Outer drum depth: 150mm or smaller			
Cable drum material: Plastic			
Weight: 9kg or less			
5 CONTROL			
5.1 CONTROL & IT INFRASTRUCTURE			
5.1.1 Managed Switch	CISCO	CBS350-48FP-4X-EU	2
Specification			
Type: Layer 3 Switch			
Interface: including 48x Gigabit Ethernet ports , 4x 10G SFP ports, 1x console port			
Throughput: 130mpps or more			
Switching capacity: 170Gbps or more			
Packet buffer: 3 MB or more			
IPV4/IPV6 routing: supported			
Hardware stacking: Up to 200 ports managed as a single system with hardware failover or superior			
Port grouping/link aggregation: Support for IEEE 802.3ad Link Aggregation Control Protocol (LACP) up to 8 groups or superior			
Power over Ethernet: 48 PoE ports with 730W total power budget, PoE, PoE+, or superior			
VLAN: Support for up 4,000 VLANs simultaneously or more			
Spanning Tree Protocol: Comply IEEE 802.1d			
RADIUS/TACACS+: Supports RADIUS and TACACS authentication			
Security: DOS attack prevention			
Fan: 1x fixed fan			
Operating temperature range: -5 to 50°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Depth: 345mm or less			
Width: 445mm or less			
Height: 44mm or less			
Power supply: 100-240VAC 50/60Hz (AC Adapter is accepted)			
Weight: 6kg or less			
Accessories: Manufacturer standard accessories			

機材仕様明細書

Technical Specifications	Reference brand		Quantity
5.1.2 Managed Switch	CISCO	CBS350-24T-4X-EU	1
Specification			
Type: Layer 3 Switch			
Interface: including 24x Gigabit Ethernet ports , 4x 10G SFP ports, 1x console port			
Throughput: 95mpps or more			
Switching capacity: 125Gbps or more			
Packet buffer: 1.5MB or more			
IPV4/IPV6 routing: supported			
Hardware stacking: Up to 200 ports managed as a single system with hardware failover or superior			
Port grouping/link aggregation: Support for IEEE 802.3ad Link Aggregation Control Protocol (LACP) up to 8 groups or superior			
Power over Ethernet: 24 PoE ports with 190W total power budget, PoE, PoE+, or superior			
VLAN: Support for up 4,000 VLANs simultaneously or more			
Spanning Tree Protocol: Comply IEEE 802.1d			
RADIUS/TACACS+: Supports RADIUS and TACACS authentication			
Security: DOS attack prevention			
Fan: 1x fixed fan			
Operating temperature range: -5 to 50°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Depth: 300mm or less			
Width: 445mm or less			
Height: 44mm or less			
Power supply: 100-240VAC 50/60Hz (AC Adapter is accepted)			
Weight: 3kg or less			
Accessories: Manufacturer standard accessories			
5.1.3 Access Point	Ubiquiti	UAP-NANOHD	1
Specification			
Type: Indoor, dual radio, 5GHz 4x4 MIMO and 2.4GHz 2X2 MIMO			
Supported radio technologies: including 802.11a/b/g/n/ac			
Ethernet port: 10/100/1000BASE-T			
Cabling type: Category 6 or superior			
Security: including WPA2, WPA3			
Wireless throughput:			
300Mbps on 2.4GHz or better			
1.7Gbps on 5GHz or better			
User support: 200 users/clients per radio			
Wireless frequency: Dual concurrent radios (2.4 and 5GHz)			
Radio and modulation type: including Dual radio, Orthogonal Frequency Division Multiplexing (OFDM)			
Antennas: Internal antennas			
Transmit power: +23dBm or more			
23dBm on 2.4GHz or better			
26dBm on 5GHz or better			
Antenna gain:			
2.5dBi on 2.4GHz or better			
5dBi on 5GHz or better			
Multiple SSIDs: 8 per radio or more			
Operating temperature range: -10 to 70°C or wider			
Operating humidity range (non condensing): 5% to 95% or wider			
Dimensions:			
Depth: 33mm or less			
Width: 160mm or less			
Height: 160mm or less			
Power supply: PoE+			
Weight: 320g or less			
Accessories: Manufacturer standard accessories			
5.1.4 LTE Router	D-Link	DWR-953V2	1
Specification			
Type 4G LTE Router			
Device interface: including followings			
Interfaces: 1 x 10/100/1000 Gigabit Ethernet WAN/LAN port			
3 x 10/100/1000 Gigabit Ethernet LAN ports			
1 x LTE SIM/USIM Slot			
1 x Reset Button			
1 x WPS Button			
1 x Power Port			
Antenna type: 2 x 2 LTE external antenna or similar			
Frequency support: including followings			
LTE band: FDD:1/3/7/8/20/28 (2100/1800/2600/900/800/700MHz)			
TDD: 38/40 (2600/2300MHz)			
UMTS: 1/8 (2100/900 MHz)			
GSM/GPRS: Quad-Bands (850/900/1800/1900 MHz)			
Data rates:			
LTE Downlink: 150Mbps or more			
LTE Uplink: 50Mbps or more			
DC-HSPA Downlink: 40Mbps or more			
DC-HSPA Uplink: 5.5Mbps or more			
Wireless standard: including IEEE 802.11 ac/n/g/b			
Wi-Fi Data Rate:			
5GHz: 860Mbps or more			
2.4GHz: 300Mbps or more			
Security Protocol: including WEP, WPA and WPA2			
Firewall: including followings			
NAT			
URL Blocking			
SPI			
MAC Filtering			
Device management: Web UI			
Operating temperature range: 0 to 40°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Depth: 33mm or less			
Width: 160mm or less			
Height: 130mm or less			
Power supply: 100-240VAC 50/60Hz (AC Adapter is accepted)			
Weight: 280g or less			
Accessories: Manufacturer standard accessories			

機材仕様明細書

Technical Specifications	Reference brand		Quantity
5.1.5 Desktop PC	HP Inc.	6B242EA#ABD	1
Specification			
Form factor - Mini			
Intel Core i5-12500T			
RAM 1x16GB DDR4,Memory Slots - 2x SODIMM			
512 GB PCIe NVMe™ M.2 SSD NVMe/SSD			
Graphics - Integrated, Intel UHD Graphics 770			
USB KB+Mouse, Realtek ALC3252 codec			
universal audio jack with CTIA and OMTP headset support			
Internal drive bays - One 2.5", Expansion slots 1x M.2 2230; 1x M.2 2280			
Ports: Front - 1x headphone/microphone combo; 1x SuperSpeed USB Type-A			
10Gbps signaling rate; 1x SuperSpeed USB Type-A 10Gbps signaling rate (charging)			
1x SuperSpeed USB Type-C 20Gbps signaling rate			
Rear: 1x power connector; 1x RJ-45; 1x SuperSpeed USB Type-A			
10Gbps signaling rate; 2x SuperSpeed USB Type-A 5Gbps signaling rate			
2x DisplayPort 1.4; 1x HDMI 2.1, Wi-Fi 6e, BT, 2x USB A+1x USB-C W11			
CPU: Intel Core i5-12500T, 2GHz, 6 cores or superior			
RAM: 16GB DDR4 3200MHz or superior			
Graphics: Integrated, Intel UHD Graphics			
SSD: 512GB or superior			
Wireless: Bluetooth, WLAN			
Ports: including 1x Ethernet 10-100-1000 Mbps RJ45, 1x USB 3.1 Type-C, c1x USB 3.1 Type-A,			
1x USB 3.2 Type-C, 1x HDMI, 1x DisplayPort			
PSU: 2 x 1200W Redundant Power Supply			
Keyboard and Mouse			
Microsoft Windows 11 Pro (EN)			
Premium Service-Packet Include (24 month)			
Operating temperature range: 5 to 35°C or wider			
Operating humidity range (non condensing): 10% to 90% or wider			
Dimensions:			
Depth: 175mm or less			
Width: 180mm or less			
Height: 35mm or less			
Power supply: 100-240VAC 50/60Hz (AC Adapter is accepted)			
Weight: 1.5kg or less			
Accessories: Manufacturer standard accessories			
5.1.6 Monitor	Iiyama	E2083HSD-B1	1
Specification			
Display			
Display panel: TN LED			
Diagonal: 19.5"			
Native resolution: 1600 x 900 or superior			
Aspect ratio 16:9			
Panel brightness: 250 cd/m² or brighter			
Static contrast 1000:1 or better			
Advanced contrast 12M:1 or better			
Response time: 5ms or better			
Color support: 16.7mln			
Horizontal Sync: 30 - 80kHz			
Pixel pitch 0.27mm			
Signal input: including followings			
VGA x1			
DVI x1			
Mechanical			
VESA mounting: 100 x 100mm			
Operating temperature range: 5°C to 35°C or wider			
Weight: 2.7kg or less			
Power supply: AC100 - 240V, 50/60Hz			
Power consumption: 15W typical			
Accessories: Manufacturer standard accessories			
5.1.7 KVM Switch	LINDY	42347	1
Specification			
Features: including followings			
Controls HDMI PC and Type C laptop or tablet from a single keyboard, mouse and monitor			
Switches via push button control, software or keyboard hot keys			
Supports resolutions: up to 4K UHD 3840x2160 at 60Hz			
Interface: including followings			
AV interface: HDMI, USB Type C			
Console interfaces: USB			
Interface standard: HDMI 18G, USB 2.0			
HDCP Support: HDCP 1.4			
Supported audio: Analogue stereo			
Separate audio ports: 2 x 3.5mm (Female)			
Max number PC/Server: 2			
Operating temperature range: 0 to 55°C or wider			
Operating humidity range (non condensing): 0% to 90% or wider			
Dimensions:			
Depth: 30mm or less			
Width: 100mm or less			
Height: 85mm or less			
Power supply: 5VDC			
Weight: 0.4kg or less			
Accessories: Manufacturer standard accessories			
6. ACCESSORIES			
6.1 PATCH PANELS			
6.1.1 Patch Bay	CANARE	32MCK-ST	3
12G-SDI Staggered Video Patchbay, Normal Thru, Blk			
6.1.2 Patch Cord	CANARE	MCVPC005	25
PACTH CORD 0,5m			
6.1.3 Patch Panel	Broadcast Solutions	1ru1x24rj45	1
Specification			
Type: 1U, 19" rack mounting, UTP patch panel			
Number of Port: 24			

機材仕様明細書

Technical Specifications	Reference brand		Quantity
6.1.4 Patch Code	EFB	K8051.0,50	10
Specification			
Type: Patch code for 6.1.3 patch panel			
Category: CAT6A			
Length: approx., 500mm			
6.1.5 Patch Panel	Ghielmetti	CSF 1x48 AV 3/1	1
Specification			
Type: 1U, 19" rack mounting, audio patch panel			
Number of Port: 48 x 3-pin			
6.1.6 Patch Cord	Ghielmetti	GMK 313/ 30	20
Specification			
Type: Patch code for 6.1.5 Patch Panel			
Connector: 3-pin			
Length: approx. 300mm			
6.1.7 Tie line Connecting Panel	Broadcast Solutions	1ruxbnc,xlr,rj45	1
Specification			
Type: 1U, 19" rack mounting, patch panel			
Number of Port: including followings			
2 x BNC			
4 x XLR			
4 x RJ45			
6.2 EXTERNAL CTP			
6.2.1 Video Termination Panel	Broadcast Solutions	1ru20bnc	2
Specification			
Type: 1U, 19" rack mounting, video termination panel			
Number of Port: 20 x BNC			
6.2.2 Audio Termination Panel	Broadcast Solutions	1ru16xlr	3
Specification			
Type: 1U, 19" rack mounting, audio termination panel			
Number of Port: 16 XLR			
6.2.3 RJ45/GPI Connecting Panel	Broadcast Solutions	1ru8 xlr,rj45	1
Specification			
Type: 1U, 19" rack mounting, connecting panel			
Number of Port: including followings			
8 x XLR			
8 x RJ45			
6.2.4 Triax Termination Panel	Broadcast Solutions	2ru4x Triax or Lemo	1
Specification			
Type: 2RU, 19" rack mounting, connecting panel			
Number of Port: 8 Trai			
Connector: Triax			
6.3 INTERCONNECTION CABLES			
6.3.1 S/FTP Cable	Broadcast Solutions	custom build	6
Specification			
Type: CAT 7, S/FTP PIMF, LSOH raw cable			
Length: approx. 15m			
Color: Blue			
6.3.2 Video Cable	Broadcast Solutions	custom build	10
Specification			
Type: Coaxial interconnection cable			
Coaxial cable characteristics: to be proposed			
Length: approx., 15m			
Connector: BNC-BNC			
6.3.3 4-wire Cable	Broadcast Solutions	custom build	2
Specification			
Type: 4-wire interconnection cable			
Length: approx., 15m			
Connector: to be proposed			

梱包条件書

1 マーキング

梱包ケースの両サイドには、下記のマークをつけること。

- (1) ケース・マーク（黒字）
（コンサイニー略称）



(Liviv, Ukraine)
(インボイス番号)
C/No. （ケース番号/ケース数）

- (2) サイド・マーク（赤字）

- 英語： TECHNICAL COOPERATION BY THE GOVERNMENT OF JAPAN
 仏語： COOPERATION TECHNIQUE PAR LE GOUVERNEMENT DU JAPON
 西語： COOPERACION TECNICA POR EL GOBIERNO DEL JAPON
 中国語： 日本国政府技術合作

- (3) CAUTION/CARE MARK (TOP MARK等)

運送途中で取扱注意が必要な場合は、関連マーク（FRAGILE, HANDLE WITH CARE, THIS WAY UP, CENTER OF GRAVITY等）を見やすい位置に貼付。危険物がある場合は、安全な梱包とし、危険物である旨マークを貼付すること。温度管理品がある場合は、温度管理品である旨マークを貼付すること。

- (4) 注意事項

- ① 輸送中での盗難防止のため、梱包ケースにはメーカー名やメーカーのマーク、MADE IN JAPANの標記等をつけないこと。
- ② 梱包ケース毎にパッキングリストを作成し、パッキングリストに記載するケース番号と実際のケースに付けるケース番号・内容品は一致させること。
- ③ 梱包ケース内の各々の包装箱・袋には、契約書中の内訳明細書の該当するアイテム番号を付すこと。

2 梱包条件

以下を参考としつつ、受注者の責任で適切な梱包とすること。

ア 海上輸送・航空輸送の共通事項

- (1) 仕向地にて大型フォークリフト等がない場合を考慮し、一梱包の重量は単品を除きできるだけ500kgを超えないようにすること。
- (2) その上で、フォークリフトによる積卸しを想定して、梱包ケースには、滑材、すり材をつけること。
- (3) 各個の重量、容積を平均化し、梱包ケース内には緩衝材を入れて、中の資機材が動揺しないようにすること。また、梱包ケースには必要に応じて重心位置を示すこと。
- (4) 危険物は、国連で定められた輸送用容器（包装・梱包方法）で輸送すること。
- (5) 免税通関が完了するまで屋外の保税蔵置場に置かれることもあるため、中の資機材が雨水で濡れないよう必要に応じ防水処理を行い、結露による錆びを防ぐための乾燥剤の封入などの対応をすること。
- (6) 精密機械や有効期間があるもののような特別配慮を要する資機材については、メーカーと相談し、メーカーが機材の特性から本梱包条件書と異なる梱包方法を提案する場合は、それを採用すること。
- (7) 付属品を含む機材は、本体と付属品を原則同じ梱包ケースに含めることとし、開梱時に機材を容易に判別できるよう配慮すること。

イ 海上輸送梱包

- (1) 長期間の海上輸送に適した堅牢かつ取扱上便利な梱包であること。そのため、原則として、合板密閉梱包とする。梱包に使用する合板は、JAS規格の普通合板とすること。ただし、機材によっては嚴重梱包が必要な場合やパレット梱包、すかし梱包またはスチール梱包等が良い場合もあるので、メーカーと相談のうえ適切な梱包とすること。
- (2) 木材梱包とする場合は、次の条件によること。
 - ①原則としてJIS Z 1402以上の規格の木箱密閉梱包とする。
 - ②重量が500kg以上かつ長さ15m、幅5m、高さ5m以内の場合は、JIS Z 1403以上の規格の枠組箱密閉梱包。
 - ③仕向地により国連公表の国際基準（ISPM NO.15）に基づき熱処理・燻蒸などの必要な処理を行った木材を使用すること。
 - ④熱処理・燻蒸証明書：必要／不要。
- (3) 必要に応じ、梱包ケースの側板の上下又は中間、及びふた板の両サイド又は中間に、胴棧を打ちつけること。
- (4) 梱包ケースは、必要に応じ、帯鋼、すみ金、かど金により補強すること。
- (5) 電気機器、精密機械、その他特別配慮を要する機材については、真空バリア

梱包とすること。

- (6) コンテナによる輸送の場合、20フィートまたは40フィートコンテナの内法寸法に配慮し、コンテナに納めたときに無駄の少ない大きさを各梱包ケースをまとめること。
- (7) FCLの場合は、その中の貨物は段ボール箱でもよい場合もあるが、LCLの場合は、合板密閉梱包又は木材梱包とすること。
- (8) 内陸輸送に当たって海上輸送用の梱包ケースを解体する場合に備え、各々のアイテムの包装をダブルカートン強化段ボール箱等内陸輸送に耐えられるものにしておくこと。

ウ 航空輸送梱包

- (1) 原則としてダブルカートン強化段ボール箱梱包とすること。
- (2) 原則として高さ160cm以内かつ長さ・幅・高さの合計が250cm以下とし、外装を含めた総重量は1個500kg以下とすること。
- (3) 航空会社は最大高さ3mまでの段積みを行うため、下段に積まれた貨物は、上段の貨物の自重に加え、航空機が運航中に受ける荷重(通常2G程度)も合わせて受けることになるので、十分な強度を持った段ボール(JIS Z 1506及びJIS Z 1516の規格を満たす複両面段ボールまたは複々両面段ボール)により、かつ JIS Z 1507の規格を満たす形状の箱とすること。上面には十分な強度を持たせ、かつ平坦な形状となるように梱包すること。
- (4) 高さ160cmを上回る場合、長さ・幅・高さの合計が250cmを上回る場合、または外装を含めた総重量が1個50kgを上回る場合は、海上輸送用梱包の条件に基づく合板密閉梱包又は木材梱包とすること。
- (5) 気圧の変化に耐えられるように梱包すること。
- (6) 危険物の場合は、ICAO、IATA等の規則に従うこと。
- (7) 温度管理品(冷蔵品、冷凍品)は、保冷剤やドライアイスなどを適切に利用すること。

以上

技師派遣条件書

技師派遣費用について、参考見積の提出を求めるものであり、技師派遣費用の見積額を選定基準とするものではない。

参考見積の為の諸条件は以下の通りとする。

- 1 対象機材 :
10カメラ搭載中継車及び6カメラ搭載中継車
- 2 業務内容 :
対象機材の開梱・検収、据付・調整、試運転、動作検証、操作及び保守トレーニング。
受講人数等の詳細は別紙トレーニング内容詳細のとおり。
- 3 技師の資格
技師は、メーカー所属の専門の技師であること。
- 4 想定派遣人数、工数 :
◆ 10カメラ搭載中継車 : 9名、16人日

No	トレーニング内容	技術者の専門分野	人数	日数	人日
1	放送用カメラの操作トレーニング	カメラ技術者	1	1	1
2	ビジョンミキサー操作トレーニング	1. ビデオ技術者、 2. ビデオ・オーディオ・IT・電源の知識を有するOB/バン制作実務経験者	2	2	4
3	Live Grafics System操作トレーニング	グラフィックオペレーター & デザイナー	1	3	3
4	オーディオミキサーの操作トレーニング	オーディオ技術者	1	1	1
5	ルータコントロール & 監視システムのトレーニング	ビデオ・オーディオ・IT・電源の知識を有するOB/バン制作実務経験者	1	1	1
6	ITインフラトレーニング	ビデオ・オーディオ・IT・電源の知識を有するOB/バン制作実務経験者	1	1	1
7	コントロールシステムトレーニング	ビデオ技術者	1	2	2
8	生中継現場での制作OJT	ビデオ・オーディオ・IT・電源の知識を有するOB/バン制作実務経験者	1	3	3
Total			9	14	16

◆ 6カメラ搭載中継車：7名、13人日

No	トレーニング内容	技術者の専門分野	人数	日数	人日
1	放送用カメラの操作トレーニング	カメラ技術者	1	1	1
2	オーディオミキサーの操作トレーニング	オーディオ技術者	1	1	1
3	ルータコントロール&監視システムのトレーニング	ビデオ・オーディオ・IT・電源の知識を有する OB/バン制作実務経験者	1	1	1
4	再生システム操作トレーニング	ビデオ技術者	1	3	3
5	ITインフラとシステムトレーニング	ビデオ・オーディオ・IT・電源の知識を有する OB/バン制作実務経験者	1	1	1
6	生中継現場での制作OJT	ビデオ・オーディオ・IT・電源の知識を有する OB/バン制作実務経験者	2	3	6
合計			7	10	13

7 参考見積に含む費用：

参考見積には以下の費用を含む。

- ・ 旅費（航空賃、日本国内交通費、現地交通費、宿泊料等含む）（必要に応じて）
- ・ 人件費
- ・ ビザ等入国のために必要な経費（必要に応じて）
- ・ 業務に必要な工具の運搬費用
- ・ 業務に必要な現地で調達する消耗品等の購入費
- ・ その他必要な経費

8 支払：

技師派遣費用は、受注者が発注者に業務完了報告書を提出後、発注者の検査に合格したあとに支払われるものとし、前払は不可とする。

請負契約のため、技師人数、派遣期間、旅費等が変動しても精算は行わない。

9 安全対策措置等

業務従事期間中、安全対策措置を講じる場合、発注者規程の安全対策措置に則った対策をすること。

なお、詳細については、JICA HP内「調達情報」に掲載の技師派遣条件書「9 安全対策措置等」にて、必要に応じ参照。（[engineer_dispatch.pdf \(jica.go.jp\)](#)）

10 参考情報：

- 図面
- 写真
- リスト
- スケジュール表
- その他（トレーニング内容詳細）

以上

10カメラ搭載中継車

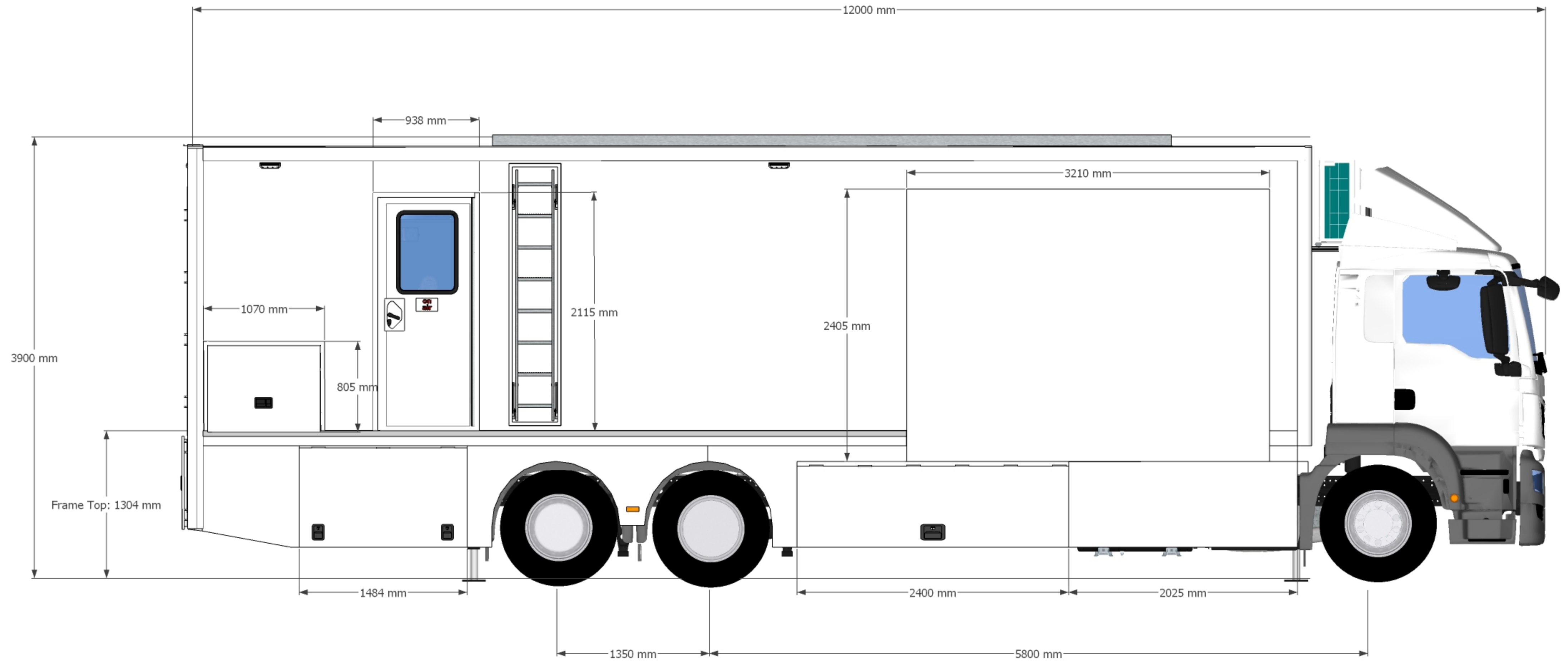
番号	トレーニング項目	内容
1.1	放送用カメラトレーニング	
1.1.1	放送用カメラ操作トレーニング	
1.1.1.1	放送用カメラ操作トレーニング	エンジニア・技術者のためのカメラ操作トレーニング 期間:最低 1日間 受講予定人数:8名
2.1	ビジョンミキサー	
2.1.1	操作&機能	
2.1.1.1	ビジョンミキサー操作トレーニング	対象者: テクニカルディレクター、ビジョンミキサー、エディター。期間:最低 1日間、受講予定人数:5名。 コース内容: ME機能の操作、複数のMEの組み合わせ、内部および外部用キーヤーのセットアップ、MEエフェクトの操作、キーマクロのセットアップ、保存済みDVEエフェクトの読み込みと使用、外部機器コントロールのセットアップ、Auxバス機能の使用、セットアップ、アプリケーション。 受講の前提条件 スイッチャー(ビジョンミキサー)の基礎と番組制作のオペレーションを理解していること。
3.1	ライブグラフィックシステム	
3.1.1	導入・システム概要・操作	
3.1.1.1		ライブグラフィックシステムの導入・概要・操作のトレーニング。 グラフィックの手動再生と自動再生。ハードウェアとソフトウェアの設定。グラフィックの作成、プロジェクト、テンプレート作成。 期間:最低 1日間 受講予定人数:3名
3.1.2	上級クラス向け	
3.1.2.1		上級向けクラスでグラフィック、プロジェクトを作成する。内容は、設定、プロパティ、外部データの取り扱い。期間:最低 1日間 受講予定人数:3名
4.1	オーディオミキサートレーニング	
4.1.1	オーディオミキサー概要トレーニング	
4.1.1.1		オーディオミキサーのシステムの概要と構成。操作と機能。期間:最低 1日間 受講予定人数:3名
5.1	ルーター・マルチビューアートトレーニング	
5.1.1	ルーター制御及びモニタリングのトレーニング	

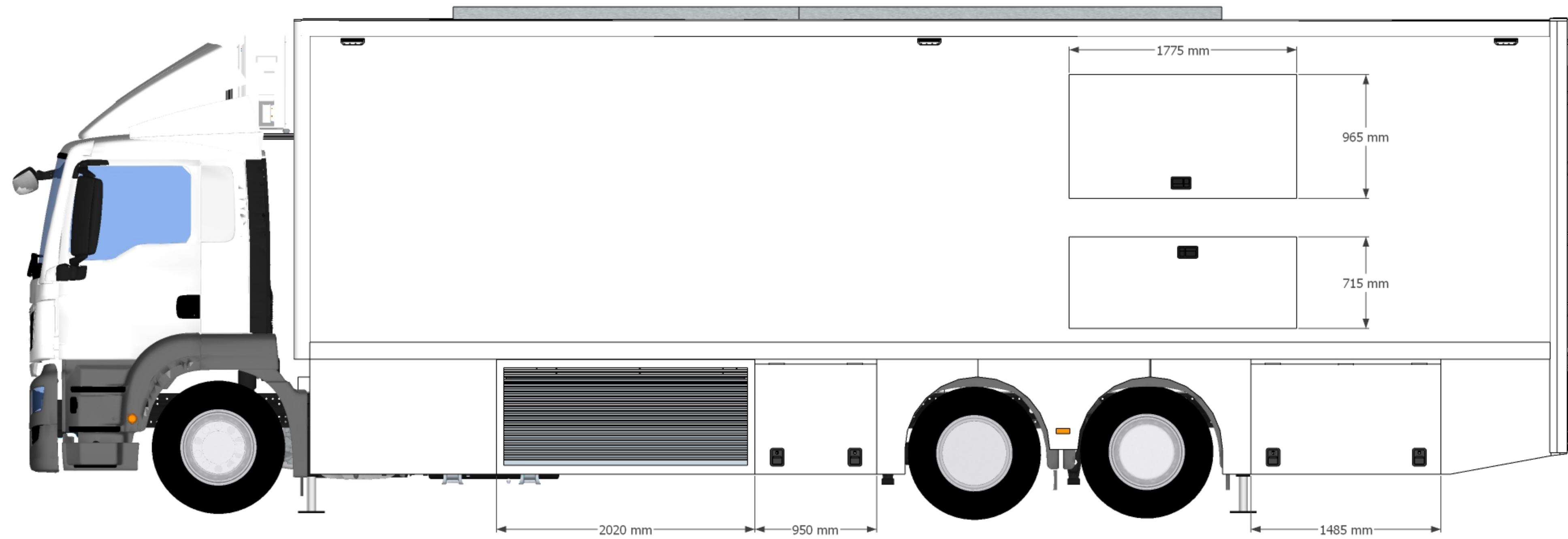
5.1.1.1		中央ルーターの制御とモニタリングの設定。エンジニア、技術者向けの運用トレーニング。コース期間 1日 受講予定人数:3名
6.1	ITインフラ	
6.1.1	ITインフラとシステム運用の研修	
6.1.1.1		ITインフラ とシステム運用 などのシステム保守、データセキュリティ、冗長化に関するトレーニング。期間:最低 1日間、受講予定人数:3名。
7.1	コントロールシステム	
7.1.1	システム操作	
7.1.1.1		ハードウェアとソフトウェアの構成、クライアント構成、ネットワーク構成 など、システム概要に関するトレーニング。エンジニア、技術者向け。期間:最低 1日間。受講予定人数:3名。
7.1.2	上級クラス向け	
7.1.2.1		高度な内容のシステム構築と試運転に関するトレーニング。対象者は チーフエンジニア、アドミニストレーター。期間:最低 1日間。受講予定人数:3名。
8.1	OJT	
8.1.1	ライブ制作現場でのOJT	
8.1.1.1		ライブ制作現場でのOJT。実践的なトレーニング。テレビ番組制作の基礎を理解し、テレビ番組制作のオペレーションを理解している方対象。期間:最低 1日間。日程と場所は、トレーニングの14日前に事前にトレーニング対象者及びウクライナ公共放送と調整を行い、合意の上で実施すること。

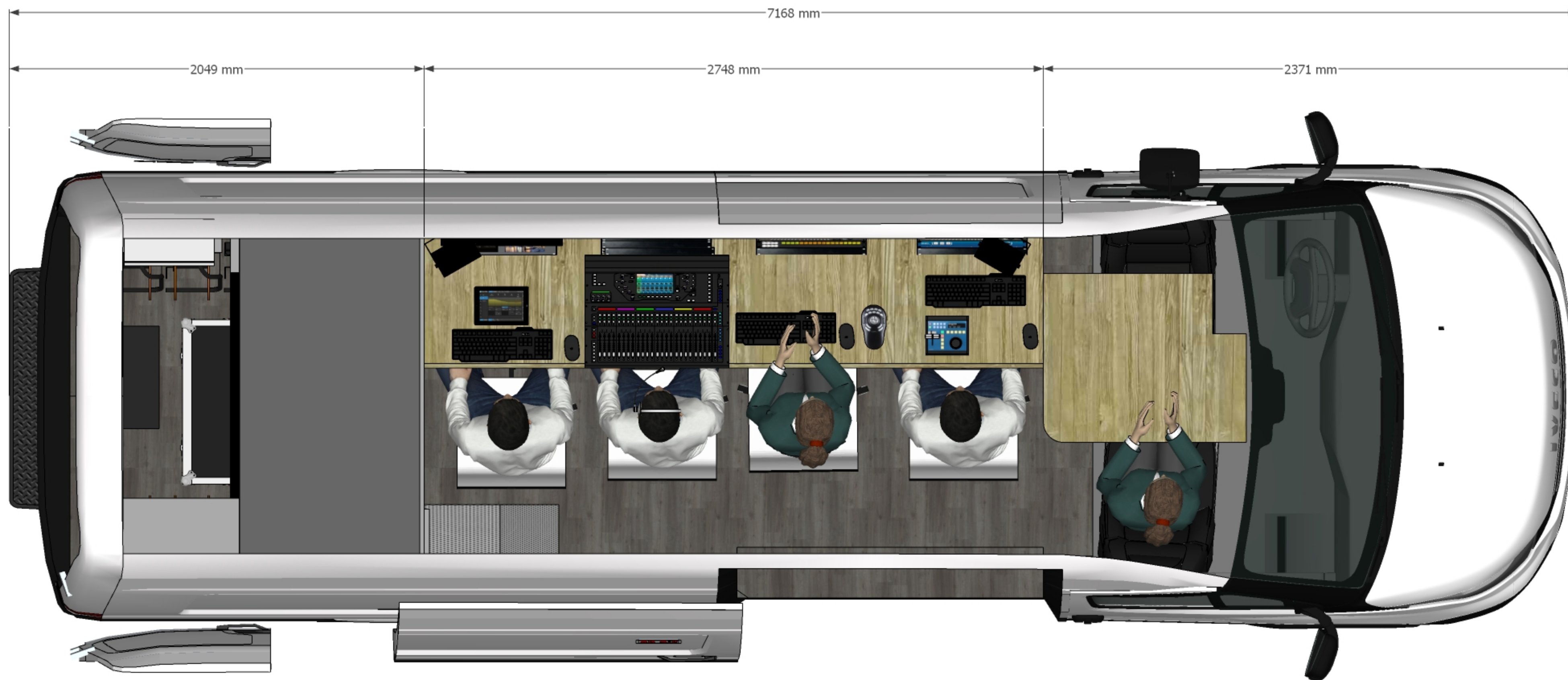
6カメラ搭載中継車

番号	トレーニング項目	内容
1.1	放送用カメラトレーニング	
1.1.1	放送用カメラ操作トレーニング	
1.1.1.1	放送用カメラ操作トレーニング	エンジニア・技術者のためのカメラ操作トレーニング 期間:最低 1日間 受講予定人数:8名
2.1	オーディオミキサートレーニング	
2.1.1	オーディオミキサー概要トレーニング	
2.1.1.1	オーディオミキサー概要トレーニング	オーディオミキサーのシステム概要と構成の操作方法と機能性トレーニング。期間:最低 1日間、受講予定人数:3名
3.1	ルーター・マルチビューアートトレーニング	
3.1.1	ルーター制御及びモニタリングのトレーニング	
3.1.1.1	ルーター制御及びモニタリングのトレーニング	ルーター制御及びモニタリングの設定研修。エンジニア、技術者向け。期間:最低 1日間、受講予定人数:3名
4.1	再生システム	
4.1.1	再生システムのトレーニング	
4.1.1.1	再生システムのトレーニング	システム概要、プロダクション操作と機能の研修。期間:最低 1日間 受講予定人数:3名
5.1	ITインフラ	
5.1.1	ITインフラとシステム運用の研修	
5.1.1.1	ITインフラとシステム運用の研修	"ITインフラ"や"システム運用"などのキーサービス、システム保守。データセキュリティ、冗長化など。期間:最低 1日間、受講予定人数:3名
6.1	OJT	
6.1.1	ライブ制作現場でのOJT	
6.1.1.1	ライブ制作現場でのOJT	ライブ制作現場でのOJT。実践的なトレーニング。参加者は、テレビ番組制作の基礎を理解し、テレビ番組制作のオペレーションを理解していること。期間:最低 1日間。日程と場所は、OJTの14日前に事前に、トレーニング対象者及びウクライナ公共放送局と調整を行い、合意の上で実施すること。











機材調達契約書

1. 件名	ウクライナ国公共放送組織体制強化プロジェクト フェーズ2向け機材（中継車）
2. 物品名及び数量	別添内訳明細書のとおり
3. 仕様	別添内訳明細書のとおり
4. 取引条件	出荷国指定場所渡し
5. 引渡場所	国際協力機構が契約する輸送業者の倉庫
6. 引渡期限	入札説明書のとおり
7. <u>技師派遣業務¹</u>	<u>別添技師派遣条件書のとおり</u>
8. <u>技師派遣期間</u>	<u>20**年 月 日～20**年 月 日</u>
9. <u>業務完了期限</u>	<u>20**年 月 日</u>
10. 契約金額	金 円
	（内 消費税及び地方消費税の合計額 円）

頭書記載の物品（以下「契約物品」という。）の調達及び技師派遣業務の実施について、発注者 独立行政法人国際協力機構 契約担当役と受注者 会社名とはおのおの対等な立場における合意に基づいて、次の条項によって契約（以下「本契約」という。）を締結し、信義に従って誠実にこれを履行するものとする。

（契約書の構成）

第1条 本契約は、本契約書本体の他、本契約の一部としての効力を持つ次に掲げる各文書により構成される。

（1）機材調達契約約款（以下「約款」という。）

（2）附属書Ⅰ「内訳明細書」

（3）附属書Ⅱ「梱包条件書」

（4）附属書Ⅲ「技師派遣条件書」

（契約業務）

第2条 受注者は、契約物品を頭書に示すところに従い調達し、発注者に引き渡さなければならない。

¹ 下線部は、各案件の条件により不要の場合がある。以下同様。

技師派遣業務のほか、現地作業、工事、修理、本邦研修などが付随する業務として含まれる場合がある。その場合は表記を改める。以下同様。

- 2 契約物品のうち輸出のために必要な検査を受ける必要のある物品は、受注者が検査料を負担して検査を受け、これに合格したものでなければならない。
- 3 受注者は、発注者が契約物品を輸出するために必要な資料を提出しなければならない。この資料とは、契約物品の品目別の重量・容積・寸法を示す資料、契約物品の英文リスト、航空輸送の場合であって契約物品が危険品・温度管理品（冷凍品・冷蔵品）に該当する場合は安全データシート又は成分表、その他発注者が別途指示する資料とする。
- 4 受注者は、附属書Ⅱ「梱包条件書」に基づく十分な輸出梱包を施すものとする。なお、熱処理が必要な場合は処理の上、その実施に係る証明書を発注者に提出するものとする。
- 5 受注者は、附属書Ⅲ「技師派遣条件書」に基づき、技師を派遣し、業務を実施するものとする。また、受注者は、契約物品の据付中、受注者側の過失により契約物品に損害あるいは損失を与えた場合は、代替品の納入もしくは修理をしなければならない。

（引渡方法）

第3条 受注者は、機材調達契約約款第5条の検査に合格した契約物品について、発注者の指示に従い頭書に定めるところにより引渡場所に搬入し、発注者が搬入されたことを確認したときをもって引渡しを完了したものとする。

（輸出管理）

- 第4条 受注者は、契約物品について、外国為替及び外国貿易法（昭和24年法律第228号）、輸出貿易管理令（昭和24年政令第378号）及びその他の輸出関連法規による許可・承認の取得並びにアメリカ合衆国による再輸出規制による許可の取得を要するか否かを確認し、発注者に報告しなければならない。
- 2 発注者は、前項による許可・承認の取得を必要とする物品（以下「該当品」という。）がある場合は、該当品及び同物品の使用に不可欠な附属物品の発注を当該許可・承認取得後まで留保するとともに、当該物品の引渡期限について別途定めることができる。
 - 3 発注者は、該当品を輸出するため、所定の申請手続を行うものとする。受注者は、発注者に対して申請に必要な書類を提出し、申請手続に協力しなければならない。
 - 4 発注者は、該当品の許可・承認の取得が不可能であると判断される場合、該当品及び同物品の使用に不可欠な附属物品の発注を取りやめ、当該物品の契約を解除することができる。この場合において、当該解除によって生じる損失は受注者の負担とする。ただし、当該解除が発注者の責による場合は、発注者が必要な範囲で負担する。

- 5 受注者が第1項に定める報告を怠った結果生じる損害については、受注者が負担する。

(消費税等)

第5条 契約書本体頭書の「契約金額」に記載の「消費税及び地方消費税」とは、消費税法及び地方税法の規定に基づくものである。

- 2 税法の改正により消費税等の税率が変動した場合、変動後の税率の適用日以降における消費税等の額は変動後の税率により計算された額とする。ただし、税法に定める経過措置に該当する場合又は消費税税率変動以前に課税資産の譲渡等が行われる場合は、消費税等の額は変動前の税率により計算された額とする。

(前払金)²

第6条 受注者は、発注者に対して、本契約を遂行する上で受注者が支出を要する費用について前払金を請求することができる。

- 2 受注者は、前項により前払金を請求しようとするときは、前払金の額について、契約書本体頭書に規定する引渡期限までを保証期間として、銀行等による保証の措置を講じ、保証書その他当該措置を講じたことを証する資料を発注者に提出しなければならない。

- 3 前払金の対象となる経費は、契約金額の機材価格に限るものとし、契約金額の10分の4相当額を限度とする。

- 4 発注者は、第1項及び第2項の規定による前払金の請求があったときは、審査のうえ、必要と認められた経費を前払金として、受注者が請求した日から起算して30日以内に支払うものとする。

- 5 業務内容の変更その他の理由により引渡期限を延長した場合には、受注者は、ただちに、第2項に基づく保証の措置に係る保証契約を変更し、変更後の保証書を発注者に寄託しなければならない。

- 6 受注者は、前払金を第3項で認めた経費以外の支払に充当してはならない。

- 7 受注者が前項の規定に違反した場合は、発注者は受注者に対して、発注者の指定した期限までに前払金支払額を返還するよう請求することができる。

² 前払金を認める案件のみ記載する。前払金を認める条件は、次のとおり。

- ・ 予定価格が3000万円以上の契約であり、かつ、
- ・ 船舶、船舶用機関、船舶のぎ装品、航空機、航空機用機関、航空機部品、車両、施設機器、訓練機器、通信機器、電子機器、プラント・医療機器等システムとして使用される機器類の建造、製造、改造又は修理あるいは設備の受注生産又は改造であって、契約締結日から船積までに120日以上を要するもの、又は
- ・ 第三国(又は、システム機材の一部を現地調達するなど現地調達品が含まれる場合には仕向地)で調達し仕向地で機構に引き渡すもの(外国から購入する物品であっても本邦で調達し船積前に機構に引き渡すものは除く。)

この場合、発注者は、前払金支払の日から返還の日まで年 5.0 パーセントの割合で計算した額の利息を付すよう求めることができる。

本契約の証として、本書を電磁的に作成し、発注者、受注者それぞれ合意を証する電磁的措置を執ったうえ、双方保管するものとする。なお、本契約は、以下の日付より効力を生じるものとする。

20**年 月 日

発注者

東京都千代田区二番町5-25

二番町センタービル

独立行政法人国際協力機構

契約担当役

理 事 理事名

受注者

(住所)

(会社名)

(代表者役職)

(代表者氏名)

機材調達契約約款

(総則)

- 第1条 受注者は、発注者と受注者で別途締結する機材調達契約書（以下「契約書本体」という。）及び本約款に定めるところに従い、契約書本体頭書に記載する契約物品（以下「契約物品」という。）を調達し、発注者に引渡し、発注者は、受注者に対しその対価を支払うものとする。
- 2 契約書本体に技師派遣業務等付随する業務（以下「本付随業務」という。）が規定されている場合、受注者は、契約書本体及び本約款に定めるところに従いこれを完了し、発注者は、受注者に対し、その対価を支払うものとする。
- 3 受注者は、契約書本体及び本約款に定めるもののほか、契約書本体第1条に定める、契約書を構成する各文書に従い調達を行わなければならない。
- 4 受注者が共同企業体を結成している場合においては、発注者は、この契約（契約書本体及び本約款に基づく契約を指し、以下「本契約」という。）に基づくすべての行為を共同企業体の代表者に対して行うものとし、発注者が当該代表者に対して行った本契約に基づくすべての行為は、当該企業体のすべての構成員に対して行ったものとみなし、また、受注者は、発注者に対して行う本契約に基づくすべての行為について当該代表者を通じて行わなければならない。
- 5 受注者が共同企業体である場合は、その構成員は、発注者に対して、連帯して本契約を履行し、本契約の業務を実施する義務を負うものとする。また、本契約に基づく賠償金、違約金及び延滞金が発生する場合は、全構成員による連帯債務とする。
- 6 受注者は、本契約の業務に関し、発注者が定める「独立行政法人国際協力機構関係者の倫理等ガイドライン」等の各種ガイドラインを遵守しなければならない。

(権利義務の譲渡等)

- 第2条 受注者は、発注者の事前の書面による承諾を得た場合を除き、本契約により生ずる権利又は義務の全部若しくは一部を第三者に譲渡し、若しくは承継させ、又は担保に供してはならない。

(再委託等の禁止)

- 第3条 受注者は、本契約の業務の実施を第三者に委託し、又は請け負わせてはならない。ただし、あらかじめ書面による発注者の承諾を得たときは、こ

の限りでない。

- 2 受注者は、前項に基づく発注者の承諾を得て本契約の業務を第三者に委託する場合、当該第三者に対し、本契約に基づき受注者に対して課せられる義務と同等の義務を負わせることとし、当該第三者の義務違反に基づく賠償義務についても連帯して責任を負う。

(所有権の移転・引渡し及び危険負担)

- 第4条 契約物品の所有権は、第5条に従った検査に合格した時に受注者から発注者に移転し、同時に当該契約物品は、発注者に引き渡されたものとする。
- 2 発注者への引渡しが完了する前に生じた契約物品についての滅失、損傷その他の損害（以下「滅失等」という）は受注者の負担とする。
 - 3 前項の滅失等が発注者及び受注者いずれの責めに帰することができない事由により生じたときは、発注者は、当該契約物品の代金の支払を拒むことができるとともに、本契約を解除することができる。

(検査)

- 第5条 受注者は、発注者への引渡しに先立ち、発注者の検査を受け、これに合格しなければならない。
- 2 受注者は、本付随業務の完了に際し、発注者の指定する者による検査を受け、これに合格しなければならない。
 - 3 発注者は、検査を行ったときは、その翌日から起算して10営業日以内に検査結果を受注者に通知しなければならない。
 - 4 受注者は、第1項及び第2項による検査の結果、契約物品に種類、品質又は数量に関して本契約の内容に適合しないもの（以下、「契約不適合」という）があった場合は、発注者は、具体的な契約不適合の内容を示して受注者に通知し、受注者は、直ちにこれを修補又は代替品を納入し、再度発注者の検査を受けなければならない。この場合において、検査結果通知の期日については前項の規定を準用する。
 - 5 発注者は、検査の一部を第三者に委任することができるものとする。

(契約不適合)

- 第6条 発注者は、引き渡された契約物品に契約不適合を発見したときは、契約不適合を知った日から1年以内に受注者にその旨を通知した場合に限り、受注者に対し、その補修、代替品の納入又は不足分の納入による履行の追完を請求することができる。
- 2 前項の履行の追完を催促したにもかかわらず、発注者が定めた期間内に受

注者が履行の追完をしないときは、発注者は、発注者の責めに帰すべき事由による場合を除き、受注者に対し、契約不適合に応じた契約物品の代金減額を請求することができる。

- 3 発注者は、契約物品に契約不適合があるときは、発注者がその契約不適合を知った日から1年以内に受注者に通知した場合に限り、本契約の全部又は一部を解除することができる。
- 4 本条の規定は、発注者による損害賠償の請求を妨げない。

(契約保証金)

第7条 発注者は、受注者に対し契約保証金を免除する。

(支払)

第8条 受注者は、発注者への契約物品の引渡しが完了したときは、発注者に契約書本体頭書の契約金額（以下「契約金額」といい、本契約に従って契約金額の変更があった場合には、変更後の契約金額を指すものとする。）の支払を請求書により請求することができる。ただし、本付随業務がある場合は、当該業務が完了するまでは、契約金額から当該業務の対価を差し引いた金額の9割を請求金額の上限とする。

- 2 発注者は、契約書本体頭書の定めにより分割納入する場合であって、受注者から請求書により請求があったときは、その都度既納部分に対する金額を支払うことができる。この場合における支払については前項の規定を準用する。
- 3 受注者は、本付随業務の完了後、第5条第2項の検査に合格したときは、発注者に当該業務に対する対価の支払を請求書により請求することができる。
- 4 発注者は、受注者より適法なる支払請求書を受領した日から30日以内に当該請求金額を受注者に支払うものとする。
- 5 前項の規定にかかわらず、発注者は、受注者の請求書の内容の全部又は一部に誤りがあると認めるときは、その理由を明示して当該請求書を受注者に返付することができる。この場合において、当該請求を返付した日から是正された支払請求を発注者が受領した日までの期間の日数は、前項に定める期間の日数に算入しないものとする。

(支払遅延利息)

第9条 発注者は、前条に規定する支払期間内に支払をしないときは、天災地変その他発注者の責めに帰すことのできない事由による場合を除き、受注者に対して、その期間満了の日の翌日から起算して支払をした日までの日数に

応じ、遅延金額に対して履行期間が経過した時点における政府契約の支払遅延防止等に関する法律（昭和 24 年法律第 256 号）に規定する利率（以下「本利率」という。）で計算した支払遅延利息を支払うものとする。ただし、遅延利息に 1 円に満たない端数があるときはこれを切り捨てる。

（期限延長と延滞違約金）

- 第 10 条 受注者の責めに帰する事由により受注者が契約書本体頭書の引渡期限までに（引渡期限日を含む。）引渡しができない場合であって、一定期間後に引渡しができる見込みがあるときは、発注者は、受注者に延滞違約金の支払いを請求するとともに、引渡期限の延長を認めることができる。
- 2 本付随業務がある場合、受注者の責めに帰する事由により受注者が契約書本体頭書の業務完了期限（業務完了期限日を含む。）までにこれを完了することができない場合であって、一定期間後に完了できる見込みがあるときは、発注者は、受注者に延滞違約金の支払いを請求するとともに、業務完了期限の延長を認めることができる。
- 3 前二項の延滞違約金の額は、契約金額のうち、当該期限までに引渡し又は本付随業務を完了していたら支払うべき金額に対し、遅延日数に応じ、本利率で計算した額とする。ただし、端数計算については前条の規定を準用する。
- 4 前項の規定にかかわらず、天災地変その他受注者の責めに帰することのできない事由によるときは、発注者は、受注者に延滞違約金を請求しないものとする。
- 5 契約書本体頭書において分割納入とする場合であって、受注者が分割納入毎の引渡期限内に納入できないとき、又は、契約書本体頭書において本付随業務の期限を複数回設定している場合であって、受注者がそれぞれの期限までに当該業務を完了できないときは、前項までの適用を受けるものとする。

（重大な不正行為に係る違約金等）

第 11 条 受注者（共同企業体にあつては、その構成員を含む。以下、本条及び次条において同じ。）が、次に掲げる各号のいずれかに該当するときは、発注者の解除権行使の有無にかかわらず、受注者は、各号のいずれかに該当するごとに、契約金額の 10 分の 2 に相当する金額を違約金として発注者の指定する期間内に支払わなければならない。

（1） 次のいずれかの目的により、受注者の役職員又はその指示を受けた者が刑法（明治 40 年法律第 45 号）第 198 条（贈賄）に違反する行為を行い刑が確定したとき。

ア 本契約の業務の実施にかかる便宜を得る目的

- イ 本契約の業務の実施の結果を受けて形成された事業の実施を内容とする契約の受注又は事業の許認可の取得等にかかる便宜を得る目的（本契約の履行期間中に違反行為が行われ、又は本契約の経費若しくは対価として支払を受けた金銭を原資として違反行為が行われた場合に限る。）
- (2) 本契約に関し、受注者又は受注者の意を受けた関係者が本契約の業務に関し、私的独占の禁止及び公正取引の確保に関する法律(昭和22年法律第54号。以下「独占禁止法」という。)第3条、第6条又は第8条に違反する行為を行い、公正取引委員会から独占禁止法第7条又は第8条の2（同法第8条第1号若しくは第2号に該当する行為の場合に限る）の規定による排除措置命令を受け、又は第7条の2第1項（同法第8条の3において読み替えて準用する場合を含む。）の規定による課徴金の納付命令を受け、当該納付命令が確定したとき。
- (3) 公正取引委員会が、受注者又は受注者の意を受けた関係者に対し、本契約の業務の実施に関して独占禁止法第7条の2第18項の規定による課徴金の納付を命じない旨の通知を行ったとき。
- (4) 受注者又はその意を受けた関係者（受注者又は当該関係者が法人の場合は、その役員又は使用人）が、本契約の業務の実施に関し、刑法第96条の6（公契約関係競売等妨害）、独占禁止法第89条第1項又は同法第90条1号及び2号に違反する行為を行い刑が確定したとき。
- (5) 第1号、第2号及び前号に掲げるいずれかの違反行為があったことを受注者（受注者が共同企業体である場合は、当該共同体の構成員のいずれか）が認めたとき。ただし、発注者は、受注者が、当該違反行為について自主的な申告を行い、かつ発注者に協力して損害の発生又は拡大を阻止し、再発防止のため適切な措置を講じたときは、違約金を免除又は減額することができる。なお、受注者が共同企業体である場合は、その構成員の一が自主的な申告を行い、かつ発注者に協力して損害の発生又は拡大を阻止し、再発防止のため適切な措置を講じたときは、発注者は、当該構成員に対し、違約金を免除又は減額することができる。
- 2 受注者が前項各号に複数該当するときは、発注者は、諸般の事情を考慮して、同項の規定により算定される違約金の総額を減額することができる。ただし、減額後の金額は契約金額の10分の2を下ることはない。
- 3 前二項の場合において、発注者の被った実損害額が当該違約金の額を超えるときは、発注者は、受注者に対して、別途、当該超過部分の賠償を請求することができるものとする。
- 4 前三項に規定する違約金及び賠償金は第12条の2に規定する違約金及び賠償金とは独立して適用されるものとする。

- 5 受注者が共同企業体である場合であって、当該共同企業体の構成員のいずれかが次の各号のいずれかに該当するときは、第1条第5項の規定にかかわらず、発注者は、当該構成員に対して第1項から第3項までに規定する違約金及び賠償金を請求せず、又は当該債務の一部を免除することができる。ただし、第2号に掲げる者のうち当該違反行為を知らずながら発注者への通報を怠ったものについては、この限りでない。
- (1) 第1項第1号又は第4号に該当する場合であって、その判決内容等において、違反行為への関与が認められないとき。
- (2) 第1項第5号に該当する場合であって、違反行為があったと認められた構成員が、当該違反行為に関与していないと認められた者
- 6 前項の適用を受けた構成員（以下「免責構成員」という。）がいる場合は、当該共同企業体の免責構成員以外の構成員が当該違約金及び賠償金の金額を連帯して支払う義務を負うものとする。
- 7 前各項の規定は、本契約が終了した後も引き続き効力を有するものとする。

（発注者の解除権）

- 第12条 発注者は、受注者が次に掲げる各号の一に該当するときは、本契約を催告を要せずして解除することができる。
- (1) 第10条による引渡期限延長の場合を除き、受注者の責めに帰すべき事由により、受注者が契約書本体頭書に定められた引渡期限内に契約物品を引き渡すことができないとき、又はその見込みがないと発注者が認めたとき。
- (2) 第10条による業務完了期限の延長の場合を除き、受注者の責に帰する事由により、受注者が、契約書本体頭書に定められた業務完了期限までに本付随業務を完了できないとき、又はその見込みがないと発注者が認めたとき。
- (3) 受注者が本契約に違反し、その違反により本契約の目的を達成することができないと認められるとき。
- (4) 受注者が次条第1項に規定する事由によらないで本契約の解除を申し出、本契約の履行を果たさないとき。
- (5) 受注者に不正な行為があったとき。
- (6) 受注者に仮差押又は仮処分、差押、競売、破産、民事再生、会社更生又は特別清算等の手続き開始の申し立て、支払停止、取引停止又は租税滞納処分等の事実があったとき。
- (7) 受注者が「独立行政法人国際協力機構関係者の倫理等ガイドライン」に違反したとき。
- (8) 受注者（受注者が共同企業体であるときは、その構成員のいずれかの者）。

以下本号及び第11条第1項において同じ。)が、次に掲げる各号の一に該当するとき、又は、次に掲げる各号の一に該当する旨の新聞報道、テレビ報道その他報道(ただし、日刊新聞紙等、報道内容の正確性について一定の社会的評価が認められている報道に限る。)があったとき。

イ 役員等(受注者個人である場合にはその者を、受注者が法人である場合にはその役員又はその支店若しくは事務所の契約を締結する代表者をいう。以下本条において同じ。)が、暴力団、暴力団員、暴力団関係企業、総会屋、社会運動等標榜ゴロ、特殊知能暴力団等(各用語の意義は、独立行政法人国際協力機構反社会的勢力への対応に関する規程(平成24年規程(総)第25号)に規定するところによるものとし、これらに準ずるもの又はその構成員を含む。以下「反社会的勢力」という。)であると認められるとき。

ロ 役員等が暴力団員でなくなった日から5年を経過しない者であると認められるとき。

ハ 反社会的勢力が経営に実質的に関与していると認められるとき。

ニ 法人である受注者又はその役員等が自己、自社若しくは第三者の不正の利益を図る目的又は第三者に損害を加える目的をもって、反社会的勢力を利用するなどしているとき。

ホ 法人である受注者又はその役員等が、反社会的勢力に対して、資金等を供給し、又は便宜を供与するなど直接的若しくは積極的に反社会的勢力の維持、運営に協力し、若しくは関与しているとき。

ヘ 法人である受注者又はその役員等が、反社会的勢力であることを知りながらこれを不当に利用するなどしているとき。

ト 法人である受注者又はその役員等が、反社会的勢力と社会的に非難されるべき関係を有しているとき。

チ 受注者が、再委託、下請負又は物品購入等にかかる契約に当たり、その相手方がイからトまでのいずれかに該当することを知りながら、当該者と契約を締結したと認められるとき。

リ 受注者が、イからトまでのいずれかに該当する者を再委託、下請負又は物品購入等にかかる契約の相手方としていた場合(前号に該当する場合を除く。)に、発注者が受注者に対して当該契約の解除を求め、受注者がこれに従わなかったとき。

ヌ その他受注者が東京都暴力団排除条例又はこれに相当する他の地方公共団体の条例に定める禁止行為を行ったとき。

(9) 契約物品が、特許法、著作権法等の法令に違反することが判明したとき。

(10) 受注者が前条第1項各号の規定の一に該当する行為があったとき。

(契約が解除された場合等の違約金)

第13条 次の各号のいずれかに該当する場合には、受注者は、発注者に対し、契約金額の10分の2に相当する金額を違約金として発注者の指定する期間内に支払わなければならない。

- (1) 前条第1項の規定により本契約が解除された場合
- (2) 受注者がその債務の履行を拒否し、又は受注者の責めに帰すべき事由によって受注者の債務について履行不能となった場合

2 次の各号に掲げる者が本契約を解除した場合は、前項第2号に該当するものとみなす。

- (1) 受注者について破産手続開始の決定があった場合において、破産法(平成16年法律第75号)の規定により選任された破産管財人
- (2) 受注者について更生手続開始の決定があった場合において、会社更生法(平成14年法律第154号)の規定により選任された管財人
- (3) 受注者について再生手続開始の決定があった場合において、民事再生法(平成11年法律第225号)の規定により選任された再生債務者等

(発注者の任意解除権)

第14条 発注者は、契約物品が引渡されるまでの間は、第12条の規定によるほか、必要があるときは、本契約を解除することができる。

2 発注者は、前項の規定により本契約を解除したことにより受注者に損害を及ぼしたときは、その損害を賠償しなければならない。

(受注者の解除権)

第15条 受注者は、発注者が本契約に違反し、その違反により本契約の業務を完了することが不可能となったときは、本契約を解除することができる。

2 前項の規定により本契約を解除した場合には、発注者は、受注者に対し契約金額の10分の2に相当する違約金を支払う。

(賠償金等)

第16条 受注者が本契約に基づく賠償金、損害金又は違約金を発注者の指定する期間内に支払わないときは、発注者は、その支払わない額に発注者の指定する期間を経過した日から支払の日まで本利率で計算した利息を付した額と、発注者の支払うべき契約金額とを相殺し、なお不足があるときは受注者に支払いを請求することができる。

2 前項の請求をする場合には、発注者は、受注者から遅延日数につき本利率で計算した額の延滞金の支払いを受注者に請求する。なお、端数計算につい

ては第9条の規定を準用する。

(解除に伴う措置)

第17条 発注者は、本契約が解除された場合においては、既に納入を受けた契約物品又は発注者が認める期間内に納入を受ける契約物品につき、これを検査し、検査に合格したものについては引渡しを受けるものとし、本契約の業務の出来高部分について、検査を終了したものについては、引渡しを受けることができるものとする。

2 前項の引渡しを受けた場合は、発注者は、当該契約物品又は出来高部分に相当する契約金額を支払うものとする。

(不正行為等に対する調査・措置)

第18条 受注者が、第11条第1項各号又は第12条第1項各号に該当する疑いがあると認められる場合は、発注者は、受注者に対して調査を指示し、その結果を文書で発注者に報告させることができ、受注者は、正当な理由なくこれを拒否してはならない。

2 発注者は、前項の報告を受けたときは、その内容を確認し、不正などの行為の有無を判断する。この場合において、発注者が調査のために必要であると認めるときは、受注者からの説明を求め、必要に応じ受注者の事業所に赴き検査を受けることができる。受注者は、正当な理由なくこれを拒否してはならない。

3 発注者は、第11条第1項各号又は第12条第1項各号に該当する不正等の事実を確認した場合は、必要な措置を講じることができる。

4 発注者は、前項の措置を講じた場合は、受注者名及び不正の内容等を公表することができる。

(天災その他の不可抗力の扱い)

第19条 自然災害又は暴動、紛争、ストライキ等の人為的な事象であって、発注者、受注者双方の責に帰すべからざるもの(以下「不可抗力」という。)により、発注者、受注者いずれかによる履行が遅延又は妨げられる場合は、当事者は、その事実発生後遅滞なくその状況を書面により本契約の相手方に通知しなければならない、また、発注者及び受注者は、通知後速やかに書面にて不可抗力の発生の事実を確認し、その後の必要な措置について協議し定める。

2 不可抗力により生じた履行の遅延又は不履行は、本契約上の義務の不履行又は契約違反とはみなさない。

(秘密の保持)

第20条 受注者は、本契約の業務の実施上知りえた非公開の情報を秘密として保持し、これを第三者に開示してはならない。

2 前項の規定は、本契約が終了した場合においても引き続き効力を有するものとする。

(契約の公表)

第21条 受注者は、本契約の名称、契約金額並びに受注者の氏名及び住所等が一般に公表されることに同意する。

2 受注者が法人であって、かつ次の各号のいずれにも該当する場合には、前項に定める情報に加え、次項に定める情報が一般に公表されることに同意する。

(1) 発注者において役員を経験した者が受注者に再就職していること又は発注者において課長相当職以上の職を経験し、かつ受注者の役員等として再就職していること

(2) 発注者との取引高が、総売上高又は事業収入の3分の1以上を占めていること

3 受注者が前項の条件に該当する場合に公表される情報は、以下のとおりとする。

(1) 前項第1号に規定する再就職者に係る情報(氏名、現在の役職、発注者における最終職名)

(2) 受注者の直近3ヵ年の財務諸表における発注者との間の取引高

(3) 受注者の総売上高又は事業収入に占める発注者との間の取引高の割合

4 受注者が「独立行政法人会計基準」第13章第6節に規定する関連公益法人等に該当する場合には、受注者は、同基準第13章第7節に規定される情報が、発注者の財務諸表の付属明細書に掲載され一般に公表されることに同意する。

(合意管轄)

第22条 本契約に関し裁判上の紛争が生じた場合には、当該紛争の内容や形式如何を問わず、東京地方裁判所又は東京簡易裁判所を第一審の専属的管轄裁判所とする。

(準拠法等)

第23条 本契約は、日本国の法律に準拠し、同法に従って解釈されるものとする。

する。

2 本契約には、国際物品売買契約に関する国際連合条約（ウィーン売買条約）の適用は一切排除されるものとする。

（契約外の事項）

第24条 本契約に定めのない事項又は本契約の条項について疑義が生じた場合には、必要に応じて発注者及び受注者が協議して、書面によりこれを定める。

以上