# Customer Interface Publication: CIP042

# KCOM GROUP PLC

# WHOLESALE OPTICAL WAVE ACCESS SERVICE DESCRIPTION AND TECHNICAL CHARACTERISTICS

Issue 3.0

December 2022

The information in this document is provided in accordance with the requirements of the Radio Equipment and Telecommunications Terminal Equipment Regulations 2000 (Statutory Instrument 2000 No. 730) to publish (in accordance with the EC Radio and Telecommunications Terminal Equipment Directive 99/05/EC) technical characteristics of interfaces to the public fixed telephone network.

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KCOM

# 1 History / Summary:

| Date | Change | By |
|---|---|---|
| 07 / 2019 | Initial Draft | |
| 05 / 2021 | Issue 2.0 – Synchronisation and added to KCOM Documentation | Andrew Machin |
| 12 / 2022 | Issue 3.0 – Specific equipment details amended | Chris Croot |

# 2 Contents

# 3 Introduction/Scope

KCOM provides wholesale network access in the form of Optical Wave Access Service (the "Service") to Communications Providers ("CPs") seeking to use KCOM's Public Electronic Network ("PECN") to offer competing communications services. The Service enables CPs to use KCOM's very high bandwidth wholesale business connectivity services to provide their residential and business End Users with retail services, such as next generation mobile telephony and broadband. The Service is provided using a point to point ("P2P") fibre bearer between two CP sites (e.g. mobile sites) in the Hull Area.

This CIP sets out the scope and technical details of the Service provided to CPs. Changes to the technical architecture and network interfaces that affect the correct working of the Service will be published by KCOM in documents made available from the address provided below. This CIP will be updated to reflect any such changes, with the most recent version available at: https://www.kcomplc.com/regulatory/kcom-wholesale/service-information/technical-interface-information/.

Changes to the technical architecture and network interfaces that affect the correct working of the service will be published by KCOM Group PLC in documents made available from the address below. If the changes impact on this document, then it will be updated.

**KCOM deploy Adva equipment within the KCOM network. References to this equipment is made to the ranges used for each element of service delivery rather than specific models.**

Enquiries relating to the technical content of this document and the availability of other publications should be directed to:

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# 4 Service Description

The Service utilises Dense Wavelength Division Multiplexing (DWDM) technology to provide a communications provider (CP) with one or more high capacity dedicated P2P Ethernet circuits, which is / are delivered by KCOM over a single fibre bearer connecting two sites. Where required there is a resilience option.

The Service also makes available to the CP the option of directly connecting their own compliant equipment to the ports on the DWDM access interface for its own capacity management purposes or presenting this option to its retail customer. (See section 2.1 below for further details.)

The Service is designed with the necessary technical features to support alternative fixed and mobile network infrastructure deployments. This includes those mobile deployments specifically requiring ADVA access interface equipment. The Service therefore can be used as a high capacity connectivity input used by CPs in their access networks, or as a high capacity terminating segment that a CP offers to their customers.

## 4.1 Optical Wave Access Service (OWAS)

The Service has a single installation variant with a small number of installation options.

The Service provides the CP with the option of either a single dedicated 10Gbps or Multiple 10Gbps circuits that are provisioned using optical DWDM technology, which divides the available capacity available on the fibre bearer.

KCOM uses ADVA DWDM technology, comprising the FSP series that present Single Fibre Working (SFW) using a 16-channel optical splitter module (CSM). The dedicated 10Gbps circuits provided by KCOM are delivered using ADVA XG Series Network Termination Equipment (“NTE”). The installation also comprises a number of ancillary elements that are either mandatory, or optional, to support the Service (e.g. amplification and power).

The Service provides two options: either a single dedicated 10Gbps circuit, or this capacity can be increased to 2*10Gbps circuits on the same ADVA XG Series. For incremental 10Gbps circuits a further XG Series pair will need to be installed. It is possible to scale the Service capacity further utilising additional wavelengths by provisioning additional ADVA XG Series up to a maximum of three ADVA XG Series and a limit of 6*10Gbps circuits.

The Service also provides the CP with the option to access the DWDM technology directly by utilising the remaining wavelength ports on the ADVA FSP Series CSM (16 Channel). This will enable the CP to directly connect its own compliant equipment to assigned ports on the ADVA FSP Series to pass their traffic over the dedicated fibre bearer, or to provide their customer with the same option. In either instance, one or more direct connections to assigned ports on the ADVA FSP Series CSM will require the use of dedicated wavelengths as specified in this document.

Due to the nature of the required specification, the Optical filters used must meet the ADVA FSP Series and XG Series equipment ranges specification, as detailed below.

The Service is provided as a single service, or a distance limited resilience option (RO2). The resilience option provides diversity in the form of physically separate fibre bearer and associated equipment.

No service offered here is available at the same NTE / separate fibre routes R01 type deployment. The specific timing requirement do not support this type of resilience.

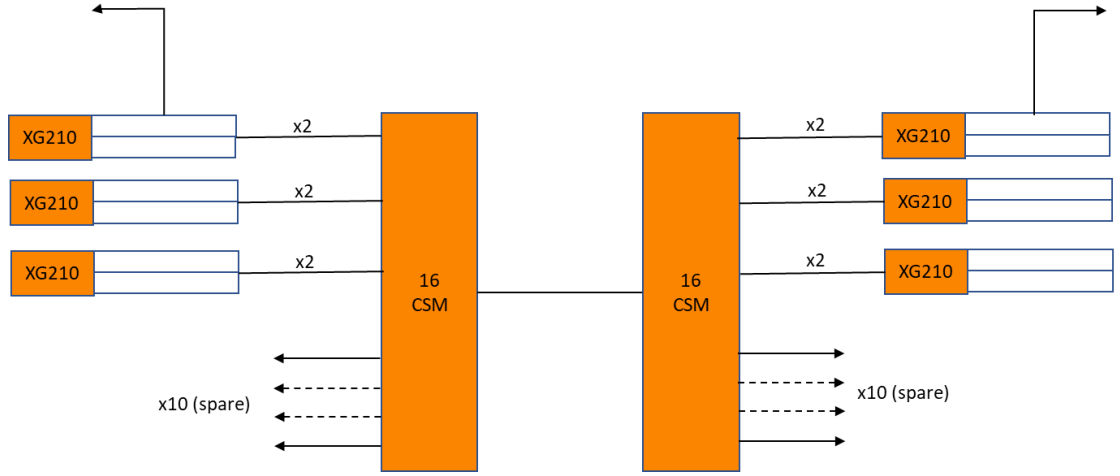
### 4.1.1 Distance limits and resilience

The Service is distance limited to 50km. The standard Service assures wavelength integrity to a distance of 30km of measured fibre distance. For distances between 30km and 50km of measured fibre distance and for all RO2 resilience paths the service requires wavelength amplification to ensure the optical parameters over which the Service is delivered maintained.

Should the CP order a RO2 type service, then another complete set of equipment, including filter, shelf, XG Series and Amplifier shelf would be fitted at both ends of the service. There are either single ended or dual ended amplification options available. In both cases, the amplification equipment must be in a location that has available power, an extra 1U of rack space and environmentally controlled to ensure that the electronic equipment delivering the Services are maintained within their normal operational parameters.

KCOM does not currently offer an extended reach variant of the Service for P2P distance exceeding 50km, or a resilience option (RO2) that requires a P2P connection exceeding 50km to provide the requisite physical or logical diversity.

*Figure 1 – Optical Wave Access Service*



Each Service design can support up to a maximum of three (3x) ADVA XG Series units per filter
Endpoint, each XG Series pair supporting up to two 10Gbps customer services. Each 10Gbps circuit uses a wavelength port on the filter. Fully deployed as above (Fig 1) therefore there would be 10 spare wavelength ports on the filter set.

The Service is designed to support, using the XG Series NTE, the transportation of phase and synchronisation and Ethernet service. To support this an SFW filter system is used for the service. An extended temperature range NTE is used for the service.

The Service allows customers to utilise their own equipment over the fibre bearer by connecting to the spare ports on the filter cards.
Connector type for the filter ports is dual fibre LC, with dual fibre LC on the client port of the XG Series.

# 5 Service availability

The Service provides the CP with a dedicated connectivity and is designed as an ‘always on’ solution. The specific performance characteristics of the Service are specified in the Service terms and condition as is the Service Level Agreement (SLA).

# 6 ADVA XG Series CP interface

The Service interface is provided to the CP on a 1310nm Single mode SFP+ that has dual fibre LC connectors.

The CP connection is provided on an ADVA XG Series service card that transmits data conveyed over the dedicated wavelength using a 10GE LAN PHY Ethernet via a tuneable DWDM module in one of the two network ports of the XG Series.

The DWDM module connects to a wavelength port on the optical splitter/filter (CSM).

## 6.1 Service card option

Each Service 10Gbps utilises the same optical filter card and customer interface presentation at each end of the service at separate sites.

## 6.2 Ethernet standards

The Service is designed to comply to industry standards for Ethernet and therefore the CP (or End User's equipment) must conform to the Ethernet standards detailed below:

Ethernet standards for fibre interfaces (IEEE 802.3ae)

- XG Series 10Gbps P2P service.
  - 10GBASE-LR 1310nm single mode 10G LAN PHY; and
  - 10GBASE-SR 850nm Multimode 10G LAN PHY.

- The Service does not support copper interfaces.

## 6.3 Ethernet frame sizes.

The maximum Ethernet Frame size for the service is 9600 bytes.

## 6.4 ADVA XG Series NTE auto negotiation and duplex.

The Service access interface configured to 10Gbps at both ends and duplex is set to 'Full' and cannot be provisioned to support Half duplex. Consistent with the standard for 10Gbps services, auto negotiation is not supported.

## 6.5 Transparency and transparency restrictions

The Service is designed as a transparent solution. Limitations to transparency result only from restrictions being applied on the XG Series unit customer interface.

The Service operates at the Ethernet frame layer and is therefore below Layer 2 of the OSI model. All traffic is transported at the binary level so other than the items restricted below, Layer 2 Ethernet control protocols are transparently passed over the Service.

All Ethernet Frames are passed over the fibre bearer other that for the known two exceptions set out below.

1. The Transport of Ethernet flow control and PAUSE frames is not supported.
2. The Transport of 802.3 EFM OAM PDUs is not supported. This is defined in the 802.3 standard for EFM equipment and applied to the Service.

Where the Service has PTP and is Sync-E configured and activated, the IEEE 1588v2 messages and the Sync-E ESMC messages are processed accordingly. Therefore, where the Service is configured in this way the transparent transmission of these packet frame types is not supported.

## 6.6 ADVA XG Series NTE managed link loss forwarding

The ADVA XG Series NTE can manage a small number of Loss Link Forwarding (LLF) configurations. The standard default LLF configuration is designed to support total loss of Service. For example, where the Service is lost because of a physical break in the fibre, or critical loss of wavelength integrity, the LLF will signal the connected equipment. In those instances where a break on the fibre between an XG Series network interface and the FSP Series filter port for a 10Gbps service breaks then only the 10Gb service interfaces using that fibre would be forced down.

The CP may choose at the point of order to request user port to user port Unidirectional LLF (ULLF). This configuration enables the generation of an internal XG Series port down system notification sent to the specified near end customer service ports, where a total loss of Service is detected. This would be propagated to the customer service port on the remote end of that service instance, forcing down that customer port. The notification would not propagate in the reverse direction.

The error condition indication for the service will either be

a) Loss of Signal (LOS) or
b) Laser off

In line with known LLF and LOS issues it is advised that the customer equipment does not further propagate the LOS error signalling without treatment as this can cause considerable issues with circuit reestablishment.

# 7 Timing service

The Service is primarily designed to support 5G services and to do so the equipment must be configured and operated to defined standards. The CP is responsible for providing and operating the timing source(s).

The Service will transport a clock source provided by the customer across the service to allow for the recovery of time and phase data. The service will support both PTP and SYNC-E.

Two feeds, a primary and optional backup feed are allowed per NTE. Both are required to be in the single timing domain supported on the ADVA XG Series NTE. Both feeds must be inserted at the same end of the service both the near and far end. This allows the ADVA XG SeriesNTE to act as a 'Boundary Clock (BC) source'

The Primary timing signals are handled by the first service card on the first near end NTE. As a maximum of two feeds are allowed per NTE and only one timing feed is allowed per service card, for a backup timing signal service a second 10Gb service on the near end NTE is required.

The synchronisation message output is transmitted on all far end Ethernet customers ports.

ADVA XG Series NTE unit pairs operate independently of each other. If a second- or third-unit pair and 10Gb service is ordered, then the XG Series bearer for this NTE is independent of the other ADVA XG Series so it can support another single timing domain from the other units.

## 7.1 Service standards

The service supports the following standards:

(a) Synchronous Ethernet (as specified)
- ITU-T G.8261
- ITU-T G.8262
- ITU-T G.8264

(b) Precision Time protocol:
- IEEE 1588v2
- ITU-T G.8275.1 for Time and Phase.

The CP needs to follow and operate to the standards detailed in 5.1(a) and 5.1(b) above.

The Service is design as a PTP aware Telecom Boundary clock, with support for full on Path Support for SyncE ITU-T G.8261, G.8262, ITU-T G.8264 and PTP ITU-T G.8275.1

In line with industry requirements the Service is only transporting Time and Phase as to the standard ITU-T G.8275.1 Profile. Therefore, it does not provide Primary Reference Time Clock, nor does it provide any traceability back to the PRTC for any of Time / Phase nor Frequency.

The CP is solely responsible for providing the required Time and Phase Traceability back to the customers Primary Timing reference clock. Traceability flags are used to indicate the loss of traceability back to the customers PRTC. Should the flags show a loss of traceability back to the customer's PRTC the PTP flow would be considered invalid as the input to the XG Series NTE used for timing.

The CP should note that the G.8275.1 standard declares the full on-path protocol support for the delivery of Time/ Phase and Frequency as an Ethernet Multicast delivery between the units.

To support the Service and interoperate with other CPs, KCOM has applied the settings detailed below. These should be inputted by the CP on their as part of the traffic stream customer first port / card on the NTE.

Should a resilient service (RO2) be ordered and configured the same setting must be used to the second service port /card on the NTE.

## 7.2 Service parameters

*Table 1: SyncE Configuration*

| Service Feature | KCOM | End User |
|---|---|---|
| SyncE | Yes | Yes |
| ESM Channel | Yes | Yes |
| QL Mode | Yes | Yes |

*Table 2: PTP Boundary Clock Configuration*

| Service feature | KCOM | End User |
|---|---|---|
| T-BC | Enabled | T-BC enabled |
| PTP clock Profile | G.8275.1 | G.8275.1 |
| PTP clock Type | BC | BC |
| PTP clock Domain | 24 | 24 |
| Priority Setting 1 | 128 | 128 |
| Priority Setting 2 | 128 | 128 |
| Local Priority | 128 | 128 |

### 7.2.1 Boundary clock configuration

Creation of a Boundary Clock KCOM follow the Provisioning and Operations GE206V, XG Series Manual Rel 11.1 Pages 308-318 and the KCOM XG Series – Boundary Clock Configuration Guide D0.1

*Table 3: PTP Port Configuration*

| Service feature | KCOM | End User |
|---|---|---|
| Master Clock Type | One Step | One Step |
| Local Priority | 128 | 128 |
| Master | Configurable if Master enabled | Enabled |
| Destination MAC | Forwardable | Forwardable |
| Sync Message Rate | 16 pps | 16 pps |
| Delay Request / Response Message rate | 16 pps | 16 pps |
| Announce Message Rate | 8 pps | 8 pps |
| Announce Receipt timeout | 8 intervals | 8 intervals |
| Sync Receipt Timeout | 16 intervals | 16 intervals |
| Delay Response Receipt Timeout | 16 intervals | 16 intervals |

## 7.3 Service throughput

As timing protocols are enabled on the service, the capacity of the link is reduced from the nominal 9.999Gbps by a total of 768Kbps for the transmission of the timing protocols.

For SyncE 384Kbps is used.

For PTP flow and messages when G.8275.1 T-BC (Telecom Boundary Clock) is enabled, 384Kbps is automatically reversed on all ports within the T-BC configuration.

The BC PTP flow must be delivered by the customer to the XG Series customer traffic port untagged by VLANs, as the BC PTP Flow is Multicast.

## 7.4 Service holdover

Holdover for the T-BC is no more than one hour. Holdover for Frequency SyncE is no more than two hours. Both times could be less than this depending on external and equipment factors.

# 8 Optical systems

The service has two primary customer optical interfaces

- XG Series NTE customer port
- FSP Series filter ports.

## 8.1 ADVA XG Series NTE optical customer ports

The Service port on the XG Series NTE is an SFP+ interface with LC connectors. The CP must not exceed the upper value for the optical input range for that port and will be responsible for any damage caused by exceeding the permissible input range of optical power rating below.

**ADVA 1310nm short range single mode**

Input range at 1310nm -13.0dBm to -1.0 dBm
Output range at 1310nm -8.0dBm to -0.5 dBm

## 8.2 ADVA FSP Series filter ports.

Table 4 below, reproduces information supplied by ADVA concerning filter port identification.

*Table 4: ADVA FSP Series filter port information*

| | A End Ports - Input | | | B End Points - Output | | |
|---|---|---|---|---|---|---|
| Filter ID | Channel No' | Frequency | Wavelength (nm) | Channel No' | Frequency | Wavelength (nm) |
| C1 | 1 | 196.0 | 1529.55 | 17 | 193.8 | 1546.92 |
| C2 | 2 | 195.9 | 1530.33 | 18 | 193.7 | 1547.72 |
| C3 | 3 | 195.8 | 1531.12 | 19 | 193.6 | 1548.51 |
| C$ | 4 | 195.7 | 1531.90 | 20 | 193.5 | 1549.32 |
| C% | 5 | 195.5 | 1533.47 | 21 | 193.3 | 1550.92 |
| C6 | 6 | 195.4 | 1534.25 | 22 | 193.2 | 1551.72 |
| C7 | 7 | 195.3 | 1535.04 | 23 | 193.1 | 1552.52 |
| C8 | 8 | 195.2 | 1535.82 | 24 | 193.0 | 1553.33 |
| C9 | 9 | 195.0 | 1537.40 | 25 | 192.8 | 1554.94 |
| C10 | 10 | 194.9 | 1538.19 | 26 | 192.7 | 1555.75 |
| C11 | 11 | 194.8 | 1538.98 | 27 | 192.6 | 1556.55 |
| C12 | 12 | 194.7 | 1539.77 | 28 | 192.5 | 1557.36 |
| C13 | 13 | 194.5 | 1541.35 | 29 | 192.3 | 1558.98 |
| C14 | 14 | 194.4 | 1542.14 | 30 | 192.2 | 1559.79 |
| C15 | 15 | 194.3 | 1542.94 | 31 | 192.1 | 1560.61 |
| C16 | 16 | 194.2 | 1543.73 | 32 | 192.0 | 1561.42 |
| | | | | | | |

The filter cards are labelled on the filter units as detailed in the first column of table 4. The frequency spacing between ports is set at 100Ghz and is designed to work with both 100GHz and 50GHz ITU-T compliant optics that are capable of operating in the frequency range 192.00THz to 196.00THz.

The centre frequency of the customer optics must be no more than +/- 0.25nm form the centre frequency of the filter card port in use. Deviations greater than this will be impacted by a significant incremental loss of optical power.

The channel numbers associated with the relevant filter port provide compliant references that should be used on the Service order form submitted to KCOM.

### 8.2.1 Frequency Table for the 16SFW

The CP should state on the Service order form which end of the fibre bearer it would like filter card A and B to be installed. In the event the CP does not specify the assignment on the Service order form KCOM will choose the assignment and inform the customer. While not exclusively the case, the A end card will be commonly installed at the first address on the Service order form.

The filters at either end, A or B of the fibre bearer operate at different frequencies associated with the operational channel and on the assigned filter ports. Single fibre working is managed with the use of a band filter module to multiplex the bands over the same fibre.

Note: Given the filters are configured to operate different frequencies on either end of each optical channel this design may not be compatible with some customer equipment using Coherent transceivers for service above 10Gbps.

### 8.2.2 Optical Channel isolation

For the 16SFW filter used in the Service,

16 CSM

- adjacent isolation is 30dB,
- nonadjacent isolation is 45dB.

### 8.2.3 Maximum Service reach

The Service is designed to the limits of the path lengths for standard and diverse links

As noted in section 2 above, the standard Service design limit is up to 30km of planned fibre cable length.

Where the Service is required to operate at a P2P distance of between 30km and 50km a single ended amplifier is specified and installed as part of the service.

### 8.2.4 Optical fibre

The service is deployed over ITU-T G.652 single mode 9/125-micron fibre.

### 8.2.5 Nominal recommended optical power input levels

- Non-amplified service into customer filter port -1dBm to +2dBm
- Amplified service
    - Where amplifiers are used the optical light levels need to be managed to tight tolerances to ensure optimal performance, otherwise there will be excessive noise generated by the amplifier for too low a level. Too High a level will impact gain and therefore the addition of further channels will be problematic.
    - Acceptable port input range -1dBm to +2dBm.

### 8.2.6 Minimum OSNR tolerance for customer optics and equipment.

For the service range,

- Up to 30km 26.0 dB minimum OSNR
- Up to 50Km 21.7 dB Minimum OSNR

### 8.2.7 Minimum optical Receiver sensitivity

For the service,

- Up to 30km -22dBm low threshold for OSNR>30dB at 0.1nm (non-amplified service).
- Up to 50km -20dBm low threshold for OSNR> 30dB at 0.1nm (amplified service)

### 8.2.8 Chromatic dispersion limits.

Based on a maximum distance of 50Km the maximum chromatic dispersion will be 849ps/nm. This is based on 16.98ps/nm.km for ITU-T G.652 single mode fibre.

### 8.2.9 Optical safety

The maximum optical output power for any customer optical channel must be no more than +4dBm for any configuration. The CP must ensure that the optical levels for each channel do not exceed this value.

### 8.2.10 Optical interworking

The Service is designed to international standards. It is the sole responsibility of the CP to ensure that the equipment used with the Service is compatible with it. CPs using coherent technologies should ensure they are safe and appropriate to use with the Service.

Channel isolation specifications are detailed in in section 6.2.2 above.

# 9 Service equipment

The Service has two major components/equipments installed:

- ADVA FSP Series passive filter shelf
    - FSP Series active Amplifier shelf
- ADVA XG Series NTE.

A KCOM service Management and Monitoring (M&M) NTE is also fitted at both ends of the Service.

## 9.1 Customer power systems and supply

The Service requires certain conditions to be met relating to the power supply, including compliance with the requirements of BS7671 (IET co published) and the current version in use of the IEE Wiring regulations.

## 9.2 KCOM M&M NTE

The KCOM M&M NTE requires a single 50Hz 13 Amp 240V AC switched power socket within 1.5 Metres of the M&M NTE.

A further single 13 Amp 240V AC switched power socket is required and available within 5 Metres at both ends for the KCOM test equipment for commissioning and maintenance activities.

A KCOM copper NTE5A will be fitted as part of the service for the connectivity for the M&M NTE. The NTE uses a maximum of 200W.

### 9.2.1 Installation and maintenance test power supply

A single 13 Amp 240V AC switched power socket is required and available within 5 Metres at both ends for the KCOM test equipment for commissioning and maintenance activities.

## 9.3 ADVA FSP Series : Power requirements and environmental constraints

### 9.3.1 Power

The standard Service has a passive filter shelf at each end of the service. This requires no power.

Where the Service includes amplification, this can be either AC or DC powered.

- For AC, there shall be two 50Hz 13Amp 240V AC switched power sockets within 1.25 metres for each Amplifier chassis. Both sockets must be off the same phase of the supply.
- For DC, a -48V DC dual feed service is required
    - The CP is solely responsible for the provision, safety, and maintenance of this supply.
    - Each of the DC feeds shall be provided on independently isolatable and fused connections.
    - The feeds shall be provided within the rack in which the KCOM equipment is fitted.
    - Wiring colours must conform to BS7671.
    - Each feed shall be provided by the customer with a 6 Amp cartridge fuse or 6 Amp MCB.
    - Each cable feed shall be of the correct size including for any voltage drop at the maximum rated current.
    - The dual feeds shall be labelled A or B on cabling and fusing.

A compliant and tested earthing bar shall be provided within the rack.

### 9.3.2 Environmental

The power consumption for the active shelf is 240 Watts.
Ambient room temperature: -20°C to +40°C
Relative Humidity 5% to 85%, non-condensing.

# 10 ADVA XG Series NTE : Power requirements and environmental constraints

The ADVA XG Series NTE has two main variants with an option of either AC or DC power for each variant.

- Standard temperature
- Extended temperature

Both units have the same requirement except for environmental conditions. The CP has the option to order either variant as part of the circuit request process.

Each ADVA XGSeries has two power units. Each ADVA XG Series NTE can only have a single type (AC or DC) of power supply.

## 10.1 Power supply

All supplies must be fused and safe for KCOM personnel to use. The CP is solely responsible for the provision, safety, and maintenance of the power supplies.

- For AC, there shall be two 50Hz 13Amp 240V Ac switched power sockets within 1.25 metres for each XG Series chassis.
    - Power consumption is approximately 105 Watts per NTE.
- For DC, a -48V DC dual feed service is required.
    - The CP is solely responsible for the provision, safety, and maintenance of this supply.
    - Each of the DC feeds shall be provided on independently isolatable and fused connections.
    - The feeds shall be provided within the rack in which the KCOM equipment is fitted.
    - Wiring colours must be to BS7671.
    - Each feed shall be provided by the customer with a 6 Amp cartridge fuse or 6 Amp MCB.
    - Each cable feed shall be of the correct size including for any voltage drop at the maximum rated current.
    - The dual feeds shall be labelled A or B on cabling and fusing.

A compliant and tested earthing bar shall be provided within the rack.

## 10.2 Environmental

The ADVA XG Series NTE, ADVA FSP Series active amplifier and associated M&M NTE is required to be operated within the environmental conditions as described below.

- Ambient room temperature of +5°C to +40°C
- Relative humidity of 5% to 85%, non-condensing.

On order an extended version of the ADVA XG Series NTE can be requested. These units have a greater range than above. The NTE is not protected against water ingress.

- Ambient room temperature of -20°C to +60°C
- Relative humidity of 5% to 95%, non-condensing.

As no other equipment in the service, such as amplifiers, can be operated at these levels, they cannot be deployed alongside an extended temperature range ADVA XG Series NTE.

# 11 Additional Information

If there are any further questions, please contact KCOM at the address or email at the front of this document or contact your KCOM Account Manager.

# 12 Safety and EMC information

## 12.1 Safety

Where the Electronic Communications Service Provider Customer (ECSP) is presented with an optical presentation this is classified as a class 1 laser product as defined in the laser safety product standards BS EN 60825-1/2 [17].

The 10/100Mbps interfaces are classified as unexposed as defined in CENELEC Reports/ETSI Guide ROBT-002/EG 201 212.[18].

## 12.2 EMC

The network equipment and terminating equipment related to the provision of the interface comply with the current EMC regulations.

Whilst predominantly intended to be installed in commercial and light industrial environments, this does not preclude the Customer Interface or End User NTEs being installed in other environments e.g. industrial.

# 13 Availability

The service will only be available within the Hull Area which accords with the geographic area defined by KCOM's PTO licence granted in 19871 or as otherwise specifically agreed with the CP.

# 14 Glossary

*Table 5 – Abbreviations*

| | |
|---|---|
| BS | BSI British Standards Institute |
| CP | Communications Provider |
| ECSP | Electronic Communications Service Provider<br>Customer |
| EMC | Electromagnetic Compatibility |
| IEEE | International Electrical and Electronic Engineers |
| IETF | Internet Engineering Task Force |
| FEUP | Fibre End User Port |
| IP | Internet Protocol |
| ISP | Internet Service Provider |
| ITU-T | International Telecommunications Union – Telecom Standardisation Sector |
| L2TP | Layer 2 Tunnelling Protocol |
| LLC | Logical Link Control |
| LAG | Link Aggregation Group |
| NTE | Network Terminating Equipment |
| NTP | Network Termination Point |
| OLT | Optical Line Terminator |
| ONT | Optical Network Termination |
| PC | Personal Computer |
| PSTN | Public Switched Telephone Network |
| PTO | Public Telecommunications Operator |
| PVC | Permanent Virtual Circuit |
| RFC | Request For Comment – IETF Publications |
| RJ11 | Registered Jack Type 11 |
| RJ45 | Registered Jack Type 45 |

# 15 References

*Table 6 – references and Standards*

| | | |
|---|---|---|
| IEEE 802.3 | Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements— Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications | 1988 |
| BS EN 60825-1/2 | Safety of laser products – Part 1: Equipment classification and requirements | 2007 |
| ROBT-002/EG 201 212 | Electrical Safety: Classification of interfaces for equipment to be connected to telecommunications networks | 1998 |
| IEEE 802.3 | Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks | 1988 to 2015 |
| IEEE 802.1ag | IEEE Connectivity fault management | 2007 |
| BS 7671 | IEE Wiring Regulations - 18th edition Requirements for electrical installations. | 2018 |
| ITU-T G.8261 | Timing and Synchronisation Aspects in Packet network | 2013 |
| ITU-T G.8262 | Timing Characteristics of a Synchronous Ethernet Equipment slave clocks | 2016 |
| ITU-T G.8264 | Distribution of timing information through packet networks | 2015 |
| ITU-T G.8275.1 | Precision time protocol telecom profile for phase / time synchronization with full timing support from the network | 2016 |
| ITU-T Y.1731 | ITU-T Connectivity check protocol. | |
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