



Customer Interface Publication: CIP037

KCOM GROUP PLC FIBRELINE ACCESS SERVICE DESCRIPTION AND TECHNICAL CHARACTERISTICS

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The information in this Customer Interface Publication (CIP) 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 99/5/EC¹) technical characteristics of interfaces used to connect to a Public Electronic Communications Network (PECN).

Users of this document should not rely solely on the information in this document, but should carry out their own tests to satisfy themselves that terminal equipment supplied by them will work with the PECN provided by KCOM Group PLC (“**KCOM**”).

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¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31999L0005&from=EN>

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DRAFT

1 INTRODUCTION

KCOM provides wholesale network access in the form of FibreLine Access (the “Service”) to Communications Providers (CPs) seeking to use KCOM’s Public Electronic Network (PECN) to offer competing fibre-based communications services.² The Service enables CPs to provide residential and business End Users within the Hull Area with retail broadband services by utilising KCOM’s network capabilities to aggregate and manage the IP traffic conveyed over the set of fixed network connections that exist between KCOM’s designated Next Generation Access (NGA) exchanges and the premises served by those exchanges.³

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/>.

This service is subject to change due to changes in the Telecommunications services and specification forums. The technical and service specification may also be impacted by a change in the associated regulatory requirements..

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

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² Under section 87 of the Communication Act (the “Act”) Ofcom has made a determination that KCOM holds Significant Market Power (SMP) in the market for Wholesale Broadband Access in the Hull Area and has required that KCOM provide relevant network access to its Public Electronic Communications Network (PECN), defined in section 151 of the Communication Act. Communications Providers (within the meaning of section 32(4)) are able to obtain such network access where a person making a reasonable request for such access provides a Public Electronic Communications Service (PECS), or a PECN, as defined in section 151 of the Communication Act. (See: <https://www.legislation.gov.uk/ukpga/2003/21/contents>.)

³ In order for a CP (PECS, or PECN) to provide End Users with a broadband solution it will be necessary to consume two component elements: FibreLine Access and KCOM’s BSIL service. BSIL provides a managed backhaul service for the aggregated broadband traffic and conveys this to a CP site in the Hull Area, or to a point of designated network interconnect for onward routing.

2 SERVICE DESCRIPTION

The service is shown in concept form below in figure 2-1 below. There are two fundamental access interfaces available to the CP: an Ethernet interface to the CP Head End located at CP premises or a designated Point of Interconnect (POI); and a customer delivery access interface on the Fibre End User Port (FEUP).

The service can be delivered over either a full fibre connection from the exchange (Fibre to the Premises (FTTP)), or a copper exchange line that uses VDSL2 technology (Fibre to the Cabinet (FTTC)).

The network equipment used by KCOM provides services for multiple CPs. Dynamic CP selection is enabled through multiple context management within the Broadband Remote Access Server (BRAS).

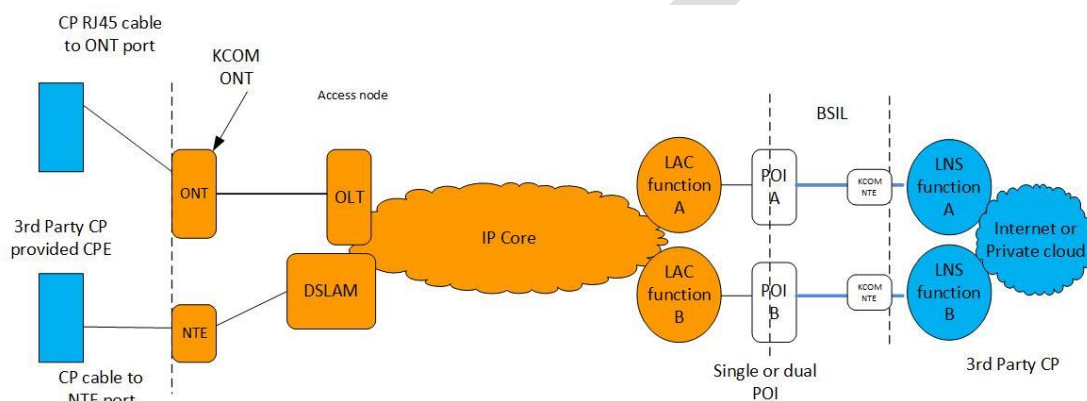


Figure 2-1

The FTTP broadband service connections are terminated by Optical Network Termination (ONT) equipment that is installed by KCOM on the End User premises. The FEUP Network Termination Point (NTP) is the KCOM designated Ethernet port on KCOM's ONT. The ONT is integral to the delivery of the Service and remains the property of KCOM.

The FTTC broadband service connections are terminated by Network Termination Equipment (NTE) installed by KCOM on the End User premises. The NTP is the (pre-filtered) broadband connection port on the faceplate of KCOM's NTE. The NTE is integral to the delivery of the Service and remains the property of KCOM.

The access element of the Service operates as an Ethernet channel system utilising the IEEE 802.1D Mac Bridging protocol to provide a IEEE 802.1q Virtual Local Area Network (VLAN) per access node per CP.

3 INTERFACES

3.1 BSIL Communication Provider Access Interface and Data Rates

The following KCOM BSIL CP access interfaces are available: 1Gbps and 10Gbps. For the full description, please refer to the KCOM CIP 041.

The connection between the KCOM BSIL NTP and the CP's own Network equipment is the responsibility of the CP.

The Ethernet interface characteristics are in accordance with the KCOM Customer Interface Publication KCH CIP 016 [2] (available at: <https://www.kcomplc.com/regulatory/kcom-wholesale/service-information/technical-interface-information/>). Other interfaces may be available by negotiation with KCOM.

The IP is presented according to the following IETF specifications:

RFC 791[3]	IETF document: Internet Protocol DARPA Internet Program Protocol Specification
RFC 826[4]	IETF document: An Ethernet Address Resolution Protocol -- or - - Converting Network Protocol Addresses to 48.bit Ethernet Address for Transmission on Ethernet Hardware
RFC 1042[5]	IETF document: A Standard for the Transmission of IP Datagrams over IEEE 802 Networks

3.2 Customer interface

The following End User access interface is available to CPs: 1Gbps as an RJ45 interface on either VDSL (FTTC) or FTTP.

The connection between the KCOM End User NTE's NTP and the CP's or End User Network equipment is the responsibility of the CP / EU.

3.2.1 Fibre delivered service

The access interface is located on the KCOM ONT sited on the End User premises. The NTP demarcation is the KCOM designated Ethernet port on KCOM's ONT. This is presented for all fibre-based (FTTP) connections as an electrical RJ45 1Gbps interface.

The ONT and Power Supply Unit (PSU) will require a flat surface with the environmental conditions as provided for in the specification detailed in this document. The ONT will require a customer supplied 240V A.C., at a nominal 2A, supply to be available within 2.5m of the ONT location. A standard IEC 13A lead will be supplied.

The connectivity between the ONT and the Customer Premise Equipment (CPE) is the responsibility of the CP. KCOM will provide CPE and connectivity to the CP on request. However these are chargeable items and outside the scope of the Service.

The Ethernet interface characteristics are in accordance with the KCOM Customer Interface Publication KCH CIP 016 [2] (available at: <http://www.KCOM.com/regulatory/accessinfo.shtml>).

The EU NTP interface is presented via a single Ethernet RJ45 socket. The RJ45 socket will be provided as an integral part of the ONT and the designated port to be used for the Service will be identified in the EU handover document.

The physical plug for connection should conform to ETS 300 001 § 8.2 (GB) [6]

3.2.2 Copper VDSL (FTTC) services

There is one variant of the VDSL service, with CP supplied CPE.

The KCOM copper exchange line is delivered to the End User on an NTE box as a Standard UK 3 pin 13 Amp type plug interface. This will be supplied and installed by KCOM. This NTE remains KCOM property and acts as the point of network demarcation.

It is the responsibility of the End User to provide an appropriate xDSL filter and attach it correctly to the line and then attach the End User provided VDSL compatible CPE which shall comply with the published NICC KCH ANFP specification and this CIP to function correctly with this service product.

In some cases, KCOM may fit or have fitted an xDSL filter plate. This may be used for the service but it is the responsibility of the End User to ensure the internal wiring is correctly configured to utilise the DSL connection correctly.

The VDSL-based broadband utilises a copper exchange line. This overlaid service can therefore only be operated in conjunction with an active voice line such as the KCOM Line Rental and can only be supplied where a KCOM copper delivery service is available.

A KCOM copper exchange line can only support one VDSL service per line pair.

KCOM VDSL-based broadband service will be automatically ceased should the copper PSTN service be cancelled or removed.

3.2.2.1 xDSL operation

Where the Service is delivered using VDSL (FTTC) technology it is configured to only operate in VDSL mode and ADSL fall back is not supported.

The Service operates to the published NICC KCH ANFP document.

KCOM does not operate Dynamic Line Management (DLM) systems outside of the standard Adaptive Line Rate (ALR) systems provided for in the standard operation of the VDSL protocols.

As standard the Downstream Noise margin operated by KCOM is 6dB on all DSL products. This is for Line stability and reduced fault management due to the short loop lengths operated on most of the KCOM physical plant where VDSL2 is available.

3.2.2.2 Line rates

The KCOM VDSL-based Service supports the VDSL2 line speeds at the rates detailed below.

Service	Downstream rate	Upstream rate
VDSL2 G.993.2	Maximum 80Mbits/s	Maximum 20Mbits/s

Where the Service supplied utilises VDSL technology then its performance varies with the exchange line length. Specifically, the distance between the DSLAM and the NTP. Variance in the line rate is due to the physical operation of the VDSL2 technology.

The line rate is the VDSL2 protocol reported line rate and needs to be reflected in the CP configured payload shaping for optimal transmission of the End User data.

3.2.2.3 Data throughput rates.

The VDSL2 protocol requires the inclusion of packet overheads to operate correctly to transport Ethernet frames and payloads.

The packet overheads include

- A 4 byte per frame routing overhead required by KCOM.
- The DSL and PPP overheads required to operate the service.

These overheads impact the actual data rates available to the End User. The scale of this impact depends on the size of the payload packets being transmitted. The ratio of the payload size to the number of packets impacts the total capacity throughput. For example, number of packets transmitted and therefore overheads required is double at 64k frame sizes than at 128k frame sizes.

The CP should carefully consider how this impacts how they interpret the service available to them in the onward products they wish to deliver using this service.

The available payload data throughput rates will always be less than the line rate due to the use of the VDSL and Ethernet protocols to transmit the payload data. The CP should consider how these and the other factors should be used in determining the downstream or upstream shapers within the CP's network.

4 SERVICE DATA RATES

The Service is provided to the End User over fibre GPON technology conforming to the KCOM customer interface specified in CIP 016 [8].

Publication KCH CIP021 [7], Technical Characteristics of the ADSL interface, Paragraph 5.

The Service data rate is based on service selected as part of the order process. The data rates quoted by KCOM are those rates the Service that is provided using our Service Platform and access network in the Hull Area. The Service does not include other network components that are needed to deliver broadband services to End Users such transit and peering. The configuration and capacity of these network elements have a direct impact on the broadband performance experienced by End Users and CPs should consider these operational parameters in advertising their products.

The broadband network path is shared and so the Service will be contended to the maxima determined by the CP. Lower service data rates may on occasion result due to deployment conditions such as fault related congestion within the KCOM network. KCOM will take all reasonable steps to minimise such occurrences.

The availability of each of the Service types, FTTC and or FTTP, is via KCOM's Post Code and address checking system that will be made available to the CP.

5 Ethernet Layer Aspects

5.1 Ethernet service

The Service provides a single Ethernet VLAN MAC bridge separated PPPoE service between the CP, the End User, and the Broadband Network Gateway (BNG) server for ethernet IP connected systems. The end user interface will be presented with an ethernet Port which will encapsulate all upstream traffic in the Carrier VLAN tag transparent to the End User. Downstream traffic to the End User will be presented to the End User at the ethernet port with no Carrier VLAN tags and the PPPoE frame outermost. The data channel will be the PPPoE presentation frame.

5.2 VLAN operation

The service uses a VLAN tag to separate the CP traffic from both KCOM and other CP traffic within the KCOM network. This tag is applied to every frame entering the KCOM network.

The KCOM network terminates this VLAN tag at the KCOM BNG LAC and then uses L2TP configuration to format and communicate the End User traffic to the connection interface of the BSIL. The BSIL then transports the L2TP tunnels and sessions to the CP end of the BCP.

5.3 Traffic Shaping

The Service operates a First In / First Out (FIFO) system within the CP requested service at all interfaces.

Traffic shaping is then, per End User service, applied to downstream traffic at the BNG and the end user upstream service which will be policed at the Ethernet port above the service requested and shaped according to the requested service at the BNG.

For the best service, the End User and CP should shape and priority transmit all traffic to the requested service point. KCOM will police at the specified point but will not operate any Quality of Service (QoS) between the CP's End User customer connections. The requirements for this are set out in KCH CIP021. [7].

6 IP SERVICE FEATURES

6.1 Transport

IP is transported from the CP to End User via Point-to-Point Over Ethernet (PPPoE) using LLC/SNAP as defined in RFC 2364 and RFC 2516 [10].

The KCOM BNG can provide both L2TP Access Concentrator (LAC) and PTA functionality. The CP must select the termination for the whole CP requirement via the CP service selected and not per End User.

As standard, the PPP session is terminated on the KCOM BNG as a LAC endpoint with the CP providing the LNS and associated Remote Authentication Dial-In User Service (RADIUS) authentication and IP address information.

When the CP requires the End User session to be terminated on the CP's Layer 2TP Network Server (LNS), the KCOM BNG acts solely as a LAC, using L2TP pass-through via the CP access interface.

For PTA mode, the CP is required to provide RADIUS data and an IP Pool containing enough of the own IP address allocation for each customer they provide service to. For more information on this service, please contact your KCOM Partner Account Manager to understand the many product options available.⁴

6.2 PPP layer requirements

KCOM will present the End User connection as a PPPoE service as PPPoE LLC/SNAP configured to support a single PPP session per VDSL line.

The KCOM Network does not auto sense the encapsulation type for VDSL traffic.

KCOM will present the EU connection as a PPPoE service as PPPoE LLC/SNAP configured to support a single PPP session per FTTP NTP.

The following Request for Comments (RFCs) describe the operation and encapsulations:

- PPP over Ethernet RFC 2516
- PPP RFC 1661
- Multi- Protocol encapsulation RFC 1483

The KCOM network requires that the PPPoE client where CPE or software based is compliant to RFC 2516 and RFC1661 in line with UK industry standards.

The PPPoE Maximum Transmission Unit is 1492 bytes.

In line with previous experience it should be noted that the service does not correct or mitigate where traffic, such as UDP configured at 1500 bytes with do not fragment set, is not correctly configured to use PPPoE as per the KCOM PPPoE requirements.

TCP traffic is required to operate the MSS process correctly for this reason.

6.3 RADIUS

The CP must provide RADIUS servers that are configured and managed by the CP. These RADIUS servers must comply with relevant IETF standards for interconnection purposes.

RADIUS information is presented to the CP via the LAN access interface over PPPoE. RADIUS attribute support is in accordance with IETF documents RFC 2865 [11], RFC 2866 [12] (formerly RFC 2138 and 2139). The CP's RADIUS servers must comply with these standards in order to successfully interconnect.

The CP must provide details of RADIUS host IP addresses (and back-up where applicable), Authentication and Accounting Server (AAS) UDP ports and shared secrets.

It is recommended that the CP has a back-up RADIUS server so that forwarded access request packets are dealt with. Failure to do so will mean that calls associated with incoming End User authentication requests will be disconnected in the event of a lack of response by the primary server. If a back-up server is successfully accessed then this will be used for future requests for a configurable period.

⁴ If you do not have an Account Manager assigned to you please contact the Director of NNS, Iain Shearman (iain.shearman@kcom.com) and he will allocate one of the KCOM Partner team members. Alternatively, if you would like further details relating to requests for new forms of network services you can obtain guidance from one of KCOM's regulatory team, who can be contacted at: regulatory@kcom.com.

The KCOM network will communicate with the CP LNS servers using an L2TP protocol to operate the service and allow for user Authorisation, Authentication and Accounting (AAA).

6.3.1 RADIUS configuration

RADIUS is required to provide the core of the authentication and authorisation for connection to the KCOM network.

The RADIUS will utilise the aggregation points and extension service to communicate with the CP RADIUS platform.

The CP may have up to two RADIUS servers working in association with the KCOM network. The service will have a single shared secret between them and the KCOM network.

There are five supported packet types.

- ID 1 Access-Request
- ID 2 Access-Accept
- ID 3 Access-Reject
- ID 4 Accounting Request
- ID 5 Accounting-Response

As per common RADIUS authentication practice, each communication from the KCOM RADIUS must be acknowledged if the response is not received after a defined period with a number of retries the CP RADIUS server will be marked as out of service. If no valid responses are received, the End User PPP session will be terminated and End User traffic will be filtered out.

Silent discard of traffic by the CP is not permitted and will be regarded as a failure to respond.

Should no valid responding RADIUS server be available then services will be marked as down and may be configured to a considerably longer retries and timeout period.

The precise attributes and attribute handling for RADIUS configuration and pass through will be discussed with each individual CP on reasonable request.

CPs requiring specific attribute configuration, or intending to use non-standard RADIUS attributes, must discuss these requirements with KCOM prior to service connection in order to avoid the potential for unexpected operation or service denial.

Example:

The access-request packet attributes that will be forwarded to the CP are:

Number	Attribute
1	User-name
2	User's PAP password
3	User's CHAP-Password
4	NAS-IP address
5	NAS-Port

The access-accept response must include the following attributes:

Number	Attribute
6	Service-type ("Framed")
7	Framed-Protocol ("PPP")
8	Framed-IP-Address

Refer to IETF document RFC 2865 [11] for a more detailed description of the attributes.

6.3.1.1 RADIUS accounting

RADIUS accounting is optional and there are a variety of methodologies available as per the RFCs.

6.3.2 REALMs or Domain identifiers.

Each CP will be assigned by agreement an AAA realm / domain to be used to identify their users to the KCOM network. This allows the CP to freely allocate the username portion of the AAA CHAP ID without reference to KCOM.

The username is not used by KCOM and the whole user ID will be passed through to the CP.

The service will be contained inside a VRF for the protection of the KCOM network and other service.

6.3.3 DNS

A Domain Name Server (DNS) is not provided as part of this service.

6.4 IP Addresses

IP addresses can be assigned dynamically, statically or consistently to the End User. These addresses must be supplied to KCOM by the CP from their RADIUS servers. Dynamic IP addresses can be hosted by KCOM if required. IP address requirements should be discussed with KCOM prior to service connection.

7 Service Management.

The handover to the CP can be in two forms.

- L2TP (LAC-LNS mode) protocol is used to tunnel the End User customer PPP session to the CP owned and operated LNS for PPP termination.
- PPP Termination and Aggregation mode (PTA Mode)

The network configuration of the handover allows for an amount of resilience to be configured on request so that two endpoint destinations can be requested as part of the resilience design.

Should this be a request of the CP then they should contact KCOM for further details.

7.1 L2TP mode

The L2TP solution is configured to operate using IPv4 and CP destination IP addressing.

The L2TP solution requires keepalives for each end user session to be received and replied to in a timely manner. If the keepalives are not returned from the CP within the specification then the current End Customer session will be removed.

7.1.1 Pass thorough

When using PPPoE the CP and the ECU they need to be aware that the session will be required to operate within the following boundaries:

PPPoE clients are expected to operate as per RFC2516 and RFC1661:

- a. End User shall send an MRU of a maximum of 1492 to the KCOM BNG LAC.
- b. The KCOM BNG LAC will send a MRU of a maximum 1492 to the End User PPPoE client.
- c. The KCOM BNG LAC and the ECU will then agree on the lower MRU.
- d. This value will then be passed to the CP LNS.

If the PPPoE client does not obey the RFCs then there may be a failure in operation of the service. There are many ways that this issue may present itself. KCOM cannot guarantee the successful operation of the service

The CP LNS must be setup correctly to offer the MTU for the service offering for PPPoE of 1492 bytes.

7.2 PTA Mode

KCOM can offer several forms of PTA service at special request. The details of this service can be supplied on request.

8 Aggregation Service and Extension Service (BSIL)

The KCOM service is terminated on one of two designated KCOM Core Sites or for the resilient service both KCOM core sites.

These Core sites provide the most appropriate level of diversity and separation available in the KCOM network. End User internet traffic that is conveyed over KCOM's network is aggregated and processed on these two CSs using KCOM LAC units.

The Service demarcation boundary is a KCOM BSIL connection from one (or both where the diversity option is taken) of the KCOM Core Sites. The CP as part of the service requests a BSIL product to backhaul the traffic from the Core sites to the CP site [in the Hull Area].

The BSIL can also be provided as an onward connection to a third party backhaul service on the CP's site within the Hull Area.

For further details of the BSIL, see KCOM CIP 041.

8.1 Route Limits

The service places operational control limits at a number of system and service control points to control and protect the service.

Specifically:

1. On the connection between KCOM network and the CP network, the service will hard limit the eBGP route advisement to 500 routes using an inbound prefix filter. A breach of the limit will cause the connection to be removed and the service closed. This is to protect other services users from CP operation errors.
2. The number of routes allowed within the BRS specific to the CP, will be limited to a complete maximum of 25,000 routes for all IP addresses regardless of type.
3. Any route counts towards this limit.

8.2 Asymmetric routing

Asymmetric routing is the responsibility of the CP to manage and control. Any traffic issues caused by asymmetric routing will be the responsibility of the CP.

It is recommended that all traffic be managed on a single link to a single customer.

Traffic policies may be put in place to enforce this restriction should there be issues ongoing.

8.3 Traffic policing

KCOM traffic policing will be used to manage the connection between the CP and the KCOM network. This is to allow for correct management of the service and alleviation of issues such as DDoS.

The total traffic allowed on any BSIL link will be as per that contracted and will include an allowance for service management overheads. Traffic will be measured and transmitted without any other policies been applied other than the service management overheads against the total bandwidth contracted.

See CIP041 for details.

8.4 Quality of service

The Service is provided as a single traffic domain. Within the aggregate system for each individual CP the traffic will be treated equally within the boundaries of the markings.

Traffic may be prioritised in various sections of the network based on these markings. However, the markings will only be recognised within the containers configured for each individual CP.

Management Traffic towards the CP will be prioritised as part of the BSIL product functionality function

Under certain congestion conditions some discards may take place across the network these will be managed on a fair weighted Q basis.

8.5 Customer equipment LNS.

Should an aggregation or extension service be taken by the CP, then a number of presentations are available as per the previous sections of the document.

The CP may be required to host and provide power and facilities for the KCOM NTE used to provide the connectivity. The conditions for this are stipulated in the appropriate

KCOM product documentation.

8.5.1 Technical presentation

KCOM will present the traffic separated by VLAN tag for each individual L2 TP tunnel. Multiple L2 TP sessions will be contained in each tunnel. It is recommended that the terminating CP device for the connection to the KCOM NTE is capable of layer 3 Communications and not come configured as a layer 2 device.

8.5.2 BGP configuration.

The KCOM service will on request support eBGP routing. Apeear will be established between the KCOM network and the CP LNS network.

The CP will provide an ASN number from a public range or request and agree with KCOM a private AS number.

Both 16-bit and 32 bit ASN are supported.

8.5.3 Load balancing.

The CP can request multiple connections to the KCOM network. However, each individual customer will only be Load balanced across two of those connections. This will be done using an agreed method of BGP and tunnel preselection. It is envisaged that each customer will discuss and agree their requirements with KCOM.

This is to allow for customers to have the ability to request service is suitable to them without KCOM been prescriptive. KCOM reserves the right to not support a method or configuration. This choice will only be made on a technical basis.

8.6 Extension path MTU.

The maximum transmission unit allowed on the PPP is 1492 bytes. However, there will be communication between the KCOM the NG LAC and the ECSC network that may be more efficiently communicated with larger packets. This is particularly useful for L2 TP and route distribution in eBGP.

Therefore, the communications between the two networks will allow up to 1900 bytes for network communication only. All other traffic should obey the PPP restrictions.

9 POSSIBLE END USER TERMINAL EQUIPMENT

9.1 Fibre to the premises option

The minimum recommended terminal equipment performance specification is: ITU-T G.992.1 Annex G [13]

For exchange lines capable of service at ITU-T G.992.5 Annex A [14], terminal equipment must be capable of operation to this specification. Otherwise, optimal stable service delivery rates may not be achieved.

An example of typical end user terminal equipment to enable successful inter-working with the service is an Ethernet PPPoE capable or RFC bridge CPE connected to a Personal Computer (PC). In this case, the combined PC and CPE must be able to:

- establish a PPP session in accordance with RFC 1661 [15]. Support PPPoE as defined in section 5 above;
- support Challenge Handshake Authentication Protocol (CHAP) in accordance with RFC 1994 [16];

- obtain an IP address via a PPPoE LCP process;
- carry out upstream traffic shaping to the Product requested rate.

KCOM are not responsible for the provision, or operation, of any End User equipment, PC operating systems, drivers and any associated software.

9.2 VDSL based option

The minimum recommended terminal equipment performance specification is: ITU-T G.992.1 Annex G [13]

For lines capable of service at ITU-T G.992.5 Annex A [14], terminal equipment must be capable of operation to this specification or optimal stable service delivery rates may not be achieved.

Compatible CPE shall comply with the published NICC KCH ANFP specification and this CIP to function correctly with this service product.

An example of typical end user terminal equipment to enable successful inter-working with the service is an Ethernet PPPoE capable or RFC bridge CPE connected to a PC. In this case, the combined PC and CPE must be able to:

- Establish a PPP session in accordance with RFC 1661 [15]. support PPPoE as defined in section 5 above
- support Challenge Handshake Authentication Protocol (CHAP) in accordance with RFC 1994 [16]
- Obtain an IP address via a PPPoE LCP process.
- use Ethernet framing to 802.3 ATM VPI/VCI 1/50 for data transmission/reception
- Carry out upstream traffic shaping to the Product requested rate.

KCOM are not responsible for the provision or operation of any end user equipment, PC operating systems, drivers and any associated software.

10 SAFETY & EMC INFORMATION

10.1 Safety

Where the CP customer interface takes the form of 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 and 100Mbps interfaces are classified as unexposed as defined in CENELEC Reports/ETSI Guide ROBT-002/EG 201 212. [18]

10.2 EMC

KCOM's network equipment including the network 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.

11 CUSTOMER BASE

The Service can be used by CPs to offer fibre-based broadband solutions to both

business and residential customers in the Hull Area (or other locations at KCOM's commercial discretion).

12 AVAILABILITY

The Service is available to CPs within the Hull Area on reasonable request (or other locations outside the Hull Area at KCOM's commercial discretion).

The Service is only available in those locations where KCOM has deployed its fibre infrastructure. In those cases where a CP is seeking to provide services to one or more End Users where KCOM has no plans to deploy fibre-based access technologies then the CP should discuss this with their Partner Account Manager.

For avoidance of doubt, the Service will not be provided on legacy Centrex or PABX Group exchange lines.

13 INTERCONNECTION ARRANGEMENTS

Interconnect with other networks is not part of this service. The CP may wish to connect this service onward but this does not form any part of this service offering beyond the CP Service access interface.

14 GLOSSARY

This Glossary includes terms used in this document.

ADSL	Asymmetric Digital Subscriber Line
ATM	Asynchronous Transfer Mode
ATU-R	ADSL Terminal Unit – Remote
CP	Communications Provider
DSLAM	Digital Subscriber Line Access Multiplexor
PECSCP	Public Electronic Communications Service provider
EU	End User
IETF	Internet Engineering Task Force
FEUP	Fibre End User Port
IP	Internet Protocol
ITU-T	International Telecommunications Union – Telecom Standardisation
KCOM	KCOM Group PLC
L2TP	Layer 2 Tunnelling Protocol
LLC	Logical Link Control
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
SNAP	Sub Network Attachment Point
SPN	Service Provider Network
UBR	(ATM) Unspecified Bit Rate
UNI	(ATM) User Network interface
VCI	(ATM) Virtual Channel Identifier
VC Mux	Virtual Channel Multiplexing
VPI	(ATM) Virtual Path Identifier

15 REFERENCES

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
KCH CIP 016	Technical Characteristics of the 10Mbit/s and 100Mbit/s digital leased line	
RFC 791	Internet Protocol DARPA Internet Program Protocol Specification	
RFC 826	An Ethernet Address Resolution Protocol -- or -- Converting Network Protocol Addresses to 48.bit Ethernet Address for Transmission on Ethernet Hardware	
RFC 1042	A Standard for the Transmission of IP Datagrams over IEEE 802 Networks.	
ETS 300 001 § 8.2 (GB)	Attachments to Public Switched Telephone Network (PSTN); general requirements for equipment connected to an analogue subscriber interface in the PSTN	1997
KCH CIP 021	Technical Characteristics of the ADSL Interface	
KCH CIP 001	Technical characteristics of the Single Analogue Line Interface	
RFC 2364	PPP Over AAL5	
RFC 2516	A Method for Transmitting PPP Over Ethernet (PPPoE)	

RFC 2865	Remote Authentication Dial In User Service (RADIUS)	
RFC 2866	RADIUS Accounting	
ITU-T G.992.1 Annex G	Asymmetric digital subscriber line (ADSL) transceivers	02/07/1999
ITU-T G.992.5 Annex A	Asymmetric digital subscriber line (ADSL) transceivers – Extended bandwidth ADSL2 (ADSL2plus)	Jan-09
RFC 1661	IETF: The Point-to-Point Protocol (PPP)	
RFC 1994	IETF: PPP Challenge Handshake Authentication Protocol (CHAP)	
BS EN 60825-1/2	[17] 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

Reference [1] may be obtained through <http://www.ieee802.org/>

References [13] and [14] may be obtained from: <https://www.itu.int/en/Pages/default.aspx>

References [2],[7] and [8] may be found at: <https://www.kcomplc.com/regulatory/>

References [6] and [18] may be found at: <http://www.etsi.org/WebSite/Standards/Standard.aspx>

References [3], [4], [5], [9], [10], [11], [12], [15] and [16] may be found at: <http://www.ietf.org/rfc.html>

Reference 17 may be obtained through: <https://www.standardsuk.com/>

16 HISTORY

Date	Issue	Comments	Author
18/07/2018	1.0	Version 1. New CIP to support new broadband Wholesale Reference Offer	TSO KCOM GROUP PLC