



Customer Interface Publication: CIP041

KCOM GROUP PLC BROADBAND SERVICE INTERCONNECT LAYER (BSIL) 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 1999/5/EC) 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 INTRODUCTION

KCOM provides network access in the form of Wholesale FibreLine Access (WFL) to Communications Providers (CPs) seeking to use KCOM's PECN to offer fibre-based broadband services. Specifically, to provide End Users (EU) with broadband services by utilising KCOM's network capabilities and the fixed network connection that exists between KCOM's designated Next Generation Access (NGA) exchanges in the Hull Area and residential or business premise served by them.

The Broadband Services Interconnect Links (BSIL) (the "Service") provides a connection between a Wholesale FibreLine (WFL) Site and a CP Site in the Hull Area using an ethernet 1Gbps or 10Gbps connection and Ethernet Interface from the requested WFL Site to the CP Site.

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/>.

The Service is subject to change where there are revisions to the technical specifications applying through industry forums and standards bodies. 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 PRODUCT SERVICE DESCRIPTION

The product is shown in concept form below in figure 2-1. The product provides a required functional section of the Wholesale FibreLine Access Service to connect the WFL functionality to the CP. This provides an Ethernet interface to the CP Head End located at CP premises or a designated Point of Interconnect (POI).

The product delivers an Ethernet 1Gb or 10Gb bearer connection from the requested WFL provision site to the CP premises. The product is configured to aggregate the CP requested EU connections as they are processed from the Layer 2 Tunneling Protocol (L2TP) Access Concentrator (LAC), attach the EU data to the correct L2TP tunnel / session and transport between KCOM and the CP in the industry standard formats. The connection also contains the functionality to handle the Remote Authentication Dial-In User Service (RADIUS) [1] communications between the KCOM LAC, KCOM Broadband Network Gateway (BNG), and the CP Radius and L2TP Network Server (LNS).

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).

As part of each CP WFL core installation order, a BSIL is required to connect that hub to the CP premises and generate the KCOM LAC to CP LNS engineering design and configuration.

The Service is terminated on one of two designated KCOM Wholesale FibreLine (WFL) Sites or for the resilient Service both KCOM WFL Sites.

These WFL Sites provide the most appropriate level of diversity and separation available in the KCOM network. EU internet traffic that is conveyed over KCOM's network is aggregated and processed on these two WFL Sites 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 WFL Sites. The CP requests a BSIL product to backhaul the traffic from the WFL 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.

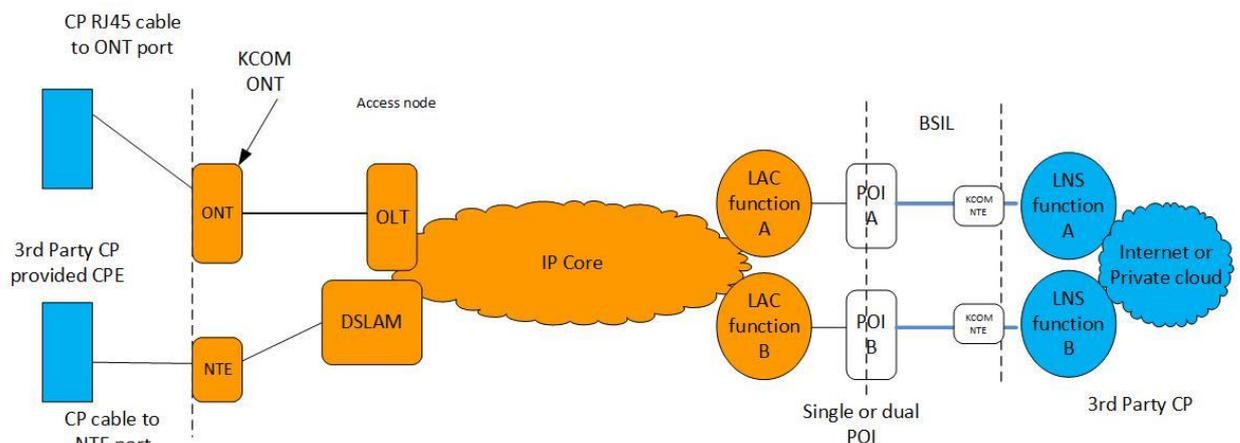


Figure 2-1

Each EU to CP connection requires a configuration to route the connection to the correct CP end point and generate the appropriate traffic path. The KCOM system then, as per the RFCs, generates the RADIUS Requests to the CP LNS via the nominated BSIL connection.

For the connection to function correctly the CP must have the appropriate LNS and RADIUS configuration. RADIUS accounting [2] will also use the BSIL to communicate the reporting packets to the 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.

The interface is located on Fibre Network Terminal Equipment (NTE) sited on the CP premises or a designated Point of Interconnect (POI). The NTEs are located on the CP's Site and remain KCOM's property. The Network Terminal Point (NTP) demarcation is the port interface on the KCOM equipment. This is presented for 1Gbps interfaces as either: (i) a RJ45 socket [3]; or 1310 Single-Mode Optical Fibre (SMF) dual fibre working Subscriber Connector (SC) / Lucent Connector (LC). It is presented for 10Gbps interfaces as a 1310 SMF dual fibre working LC.

The Fibre NTE will require a 19" rack mount with the environmental conditions as provided for in the manufacturer specification. The Fibre NTE will require a customer supplied 240V A.C., at a Nominal 5A, supply to be available within 3m of the Fibre NTE location. A standard IEC 13A lead will be supplied.

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 CIP 016 [4] (available at: http://www.KCOM.com/regulatory/access_info.shtml). Other interfaces may be available by negotiation with KCOM.

The IP is presented according to the following IETF specifications:

RFC 791[5]	IETF document: Internet Protocol DARPA Internet Program Protocol Specification
RFC 826[6]	IETF document: An Ethernet Address Resolution Protocol -- or - - Converting Network Protocol Addresses to 48.bit Ethernet Address for Transmission on Ethernet Hardware
RFC 1042[7]	IETF document: A Standard for the Transmission of IP Datagrams over IEEE 802 Networks

3.2 Line rates

The KCOM BSIL product supports the line speeds at 1Gbps and 10Gbps. These rates are inclusive of all traffic type and packet sizes so actual throughput will be lower than the stated line rate. This is normal for varying traffic types and frame sizes.

A service management overhead is required and included. CPs must allow for the following prioritised management overheads:

- a) the L2TP session setup, breakdown, and keepalives
- b) the RADIUS keepalives and session information.
- c) RADIUS Accounting traffic at the rate of one update per 60 minutes per EU session.

The line speeds are the maximum possible and the performance of components outside of KCOM's control may impact these rates.

4 Ethernet Layer Aspects

4.1 Ethernet service

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

4.2 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 EU traffic to the connection interface of the BSIL. The BSIL then transports the L2TP tunnels and sessions to the CP end of the BCP.

4.3 Traffic Shaping

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

Traffic shaping operates on a per EU service and is applied to downstream traffic at the BNG and the EU upstream service. This traffic shaping is policed by KCOM at the relevant Ethernet port and shaped according to the requested Service at the BNG.

For the optimal service the EU and CP equipment 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 EU connections. The requirements for this are set out in KCOM CIP021 [8].

5 IP SERVICE FEATURES

5.1 Transport

IP is transported from the CP to EU via Point-to-Point Over Ethernet (PPPoE) using LLC/SNAP as defined in RFC 2364 [9] and RFC 2516 [10].

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

As standard, the PPP session is terminated on the KCOM BNG as a LAC endpoint with the CP providing the LNS and associated RADIUS authentication and IP address information.

When the CP requires the EU session to be terminated on the CP's 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 their own IP address allocation for each customer they provide service to.

6 KCOM to CP Network Interconnect.

The technical traffic specification and formatting to the CP can be in one of two distinct technical formats.

- L2TP (LAC-LNS mode) protocol is used to tunnel the EU 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 BSIL Service

The Service is terminated at one of two designated KCOM WFL Sites or for the resilient Service both KCOM WFL Sites.

These WFL Sites provide the most appropriate level of diversity and separation available in the KCOM network. EU internet traffic that is conveyed over KCOM's network is aggregated and processed on these two WFL Sites 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 WFL Sites. The CP as part of the Service requests a BSIL product to backhaul the traffic from the WFL 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.

7.1 L2TP IP addressing

For the KCOM L2TP connection IPv4 is used. IP addresses can be either

- a) Allocated by KCOM as Private IP as per RFC1918.
- b) CP allocated Private or Public IP addresses.

Note: All IP addresses must be agreed by KCOM and KCOM reserves the right to prevent clashes with other parties as part of KCOM's fault management process.

For CP allocated IP addresses, KCOM will require up to 4/28 ranges to be made available to cover the possible Service configurations. A Loopback address may be

assigned by KCOM and agreed with the CP.

7.2 Service management traffic

For the correct operation of the WFL Service the BSIL is required to be configured to handle the types of traffic to ensure the functionality is properly controlled. Therefore, all EU traffic to and from the CP is handled on a FIFO basis, except for the management traffic of the Service.

7.3 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 aggregation link will be as per that contracted. Traffic will be measured and transmitted without any policies being applied other than the total bandwidth contracted.

7.4 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.

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

7.5 Customer equipment LNS

As part of the Service the CP will need an Industry standards compliant connection either directly into the CP's LNS system or an ethernet device capable of handling the onward switching and routing to the CP's LNS system.

As part of the L2TP specification the CP will need to be able to terminate the L2TP tunnels and sessions via the appropriate technology and Layer 3 routing.

The CP will be required to host and provide power and facilities for the KCOM NTE used to provide the connectivity at the CP Site. The conditions for this are stipulated in the KCOM CIP035 [11].

7.5.1 Technical presentation

KCOM will present the traffic separated by VLAN tag for each individual L2TP tunnel. Multiple L2TP 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 does not come configured as a layer 2 device.

7.5.2 BGP configuration

The Service may on request support EBGP (External Border Gateway Protocol) routing. This 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.

7.5.3 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 technical requirements with KCOM.

7.6 Management MTU

The Maximum Transmission Unit (MTU) allowed on the PPP [12] is 1,492 bytes. However, there will be communication between the KCOM LAC and the CP network that may be more efficiently communicated with larger packets. This is particularly useful for L2TP and route distribution in EBGp. Therefore, the communications between the two networks will allow up to 1,900 bytes for network management communication only. All other traffic should obey the PPP restrictions.

8 SAFETY & EMC INFORMATION

8.1 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 [13].

The 10Mbps and 100Mbps interfaces are classified as unexposed as defined in CENELEC Reports/ETSI Guide ROBT-002/EG 201 212.[14]

8.2 EMC

KCOM's network equipment, including the relevant network terminating equipment, complies with the current EMC regulations.

The Service will often be installed in commercial and light industrial environments. However, this does not preclude the customer interface or EU NTEs being installed in other environments.

9 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.

10 AVAILABILITY

The Service is available to CPs within the Hull Area on reasonable request.

11 INTERCONNECTION ARRANGEMENTS

Interconnection with other networks does not part of the Service.

12 ABBREVIATIONS

This section includes terms used in this document.

CP	Communications Provider
EBGP	External Border Gateway Protocol
EU	End User
IETF	Internet Engineering Task Force
IP	Internet Protocol
KCOM	KCOM Group PLC
L2TP	Layer 2 Tunnelling Protocol
LLC	Logical Link Control
NTE	Network Terminating Equipment
NTP	Network Termination Point
PECN	Public Electronic Communications Network
PSTN	Public Switched Telephone Network
RFC	Request For Comment – IETF Publications
SNAP	Sub-Network Attachment Point

13 REFERENCES

[1]	RFC 2865	Remote Authentication Dial In User Service (RADIUS)	
[2]	RFC 2866	RADIUS Accounting	
[3]	KCOM CIP 016	RJ45 details in section 2	
[4]	KCOM CIP 016	Technical Characteristics of the 10Mbit/s, 100Mbit/s digital leased line and 1Gb, 10Gb Digital interfaces	
[5]	RFC 791	Internet Protocol DARPA Internet Program Protocol Specification	
[6]	RFC 826	An Ethernet Address Resolution Protocol – or – Converting Network Protocol Addresses to 48.bit Ethernet Address for Transmission on Ethernet Hardware	
[7]	RFC 1042	A Standard for the Transmission of IP Datagrams over IEEE 802 Networks.	
[8]	KCOM CIP 021	Technical Characteristics of the ADSL Interface	
[9]	RFC 2364	PPP Over AAL5	
[10]	RFC 2516	A Method for Transmitting PPP Over Ethernet (PPPoE)	
[11]	KCOM CIP 035	KCOM Ethernet Connect Access Service (ECAS) and Ethernet Direct Access Service (EDAS) Service Description and Technical Characteristics	
[12]	RFC 1661	IETF: The Point-to-Point Protocol (PPP) [15]	
[13]	BS EN 60825-1/2	Safety of laser products – Part 1: Equipment classification and requirements	2007
[14]	ROBT-002/EG 201 212	Electrical Safety; Classification of interfaces for equipment to be connected to telecommunications networks	1998
[15]	RFC 1994	IETF: PPP Challenge Handshake Authentication Protocol (CHAP)	

References [1], [2], [5], [6], [7], [9], [10], [12] and [15] may be found at: www.ietf.org/standards/rfcs/

Reference [3], [4], [8] and [11] may be found at: www.kcomplc.com/regulatory/kcom-wholesale/service-information/technical-interface-information/

Reference [13] may be obtained through: www.standardsuk.com

Reference [14] may be found at: www.etsi.org/standards

14 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
27/09/2019	1.1	Version 1.1. Final CIP updated from draft	Technology KCOM Group PLC