

## **Request for Proposals for Telecoms Network**



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Comux UK Ltd.

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## 2. Background

In 2012 the Government made a decision to introduce a new tier of local digital television programme services (“local TV”), and established the required statutory framework within which local TV could be licensed by the Office of Communications (“Ofcom”).

Ofcom has now licensed 34 local TV services to broadcast on digital terrestrial television (“Freeview”). It has also licensed Comux UK Ltd (“Comux” or the “company”) to provide the Freeview multiplex which carries all local TV services. Comux’s business model is to broadcast national video streams at all 34 locations alongside the local TV service which is unique to each location.

Comux launched its first local TV service on 26 November 2013, only ten months after award of licence: the current licence runs for 12 years until 26 November 2025. As Comux is now mid-way through the licence term it is taking the opportunity to look for new contractors to supply its data network and Internet connectivity requirements.

The network is designed to connect Comux to its Freeview transmitter sites, the BBC (for contribution of electronic programme guide data which is cross-carried between all Freeview multiplex operators) and the operators of all of the local and national channels carried by Comux.

## 3. RFP Response

Comux has endeavoured to prepare this RFP on a functional requirements basis and so responses should include as much detail as possible on which of the vendor’s current range of solutions could meet these requirements, together with recurring and non-recurring prices to cover all aspects of service provision including but not limited to design, delivery and integration.

The network supports Comux’s real time video distribution requirements and so the company’s primary objective is to procure a reliable, stable network that will allow for uninterrupted connection to its network of terrestrial television transmitter sites.

The selected supplier should be an established provider of data transit services and internet access, willing to provide such a network together with design, implementation and management services related to such a network.

It is at Comux’s sole discretion as to whether it moves this project forward. Comux accepts no responsibility for any costs that may be incurred by vendors in responding to this RFP.

All third-party trademarks are hereby acknowledged.

Tenderers shall provide a written response to this document which should be emailed to [tenders@comux.co.uk](mailto:tenders@comux.co.uk)

The final date for receipt of responses to be received by Comux is 28 June 2019.

#### 4. Delivery timescales,

Comux expect all services to be delivered and operational within 9 months of contract award.

#### 5. Term

The minimum term for the circuit provision for the NOC, transmitter sites and BBC sites shall align with the end of the Comux Multiplex licence that is 26 November 2025.

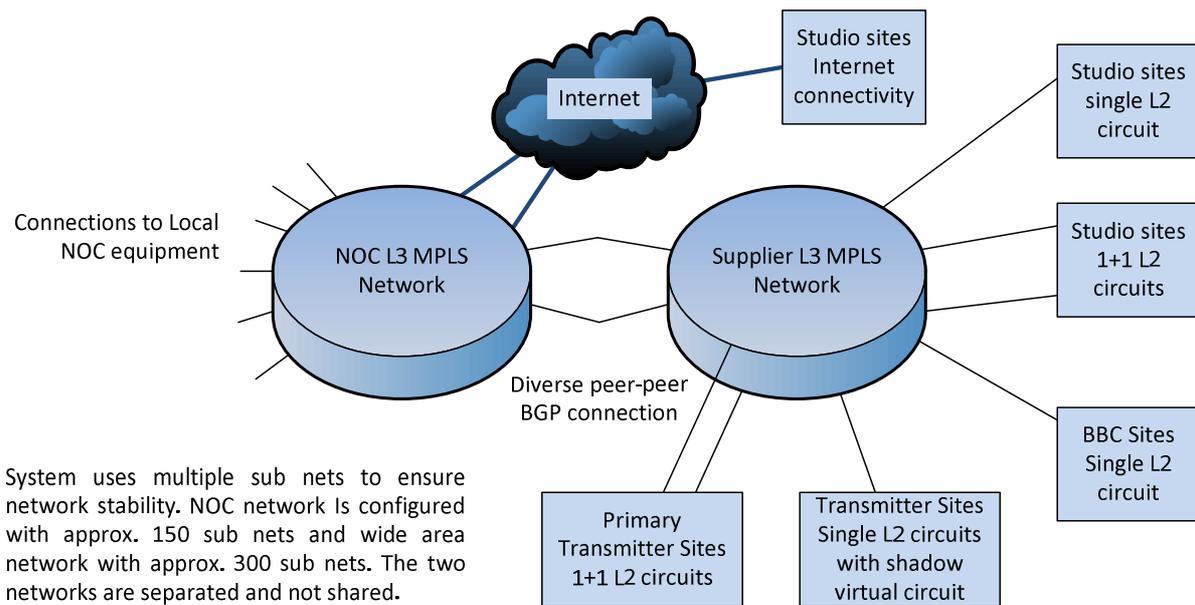
The minimum term for studio sites shall be 24 months from start of service at that site to allow for flexibility in studio locations.

#### 6. System Overview

The Comux multiplex broadcasts on the Freeview platform from a number of terrestrial TV transmitter sites around the UK. Comux is looking for a single contractor to provide a Layer 3 managed MPLS virtual private network in order to connect together various studio sites, television transmitter sites and the Customer's headquarters in Birmingham. Site specific details are provided in Schedule 1. Tenderers are requested to provide costs on a per site basis and the schedule is attached as an excel spreadsheet for this purpose.

It should be noted that the Comux network is used almost entirely for compressed video transport in real-time data streams for broadcast: this requires a high quality network with very low packet drop.

Because of its function the Comux network will present some specific and unusual challenges. The company operates at a relatively large number of remote sites, but the equipment count at each site is small. However, Comux devices operate at a high bandwidth and the real time nature of the traffic means that data must be passed over the network without delay or loss. The current network has been designed with security as a high priority and uses a large number of subnets to restrict the access of devices to only those parts of the network to which they should connect. The network supports a shared medium for data handling both real time streams and large file transfers.



### Comux Network

The network will consist of a Layer 3 MPLS virtual private network providing secure, private connectivity between multiple sites, with Layer 2 synchronous leased lines connecting the various sites to the MPLS network.

The Network Operations Centre (“NOC”) located at the Birmingham Science Park in Aston, Birmingham, is the heart of the Comux operation. The NOC contains the video playout, multiplexing and network adaptation equipment required to generate all of the local TV services. This equipment is connected by Comux’s local NOC Layer 3 network: the supplier shall interface their network to this peer network using BGP. The two networks shall be non-overlapping and not shared.

The network has two parts; Contribution and Distribution. The Contribution Network provides the paths for all of the video content coming into the NOC for processing. The data currently consists of real time video streams in compressed format including ASI and JPEG plus large video file transfers.

The Distribution Network provides the connectivity to Comux’s Freeview transmitter sites: the data to the transmitter sites is almost entirely real-time transport stream ASI/IP encapsulated according to SMPTE 2022 with a low level of management data to manage the terminal equipment.

Techex Ltd. of Bracknell are Comux’s principal technical supplier and they operate the local NOC network. The successful supplier shall liaise with Techex over the network design so that the operations can be smoothly migrated over from the current to the new network.

## 7. Technical Requirements

### 7.1. Key technical requirements:

The proposed new supplier (“Supplier”) solution shall meet the following key technical requirements:

- i. All sites shall have traffic prioritisation capabilities to ensure transmitted live video data takes precedence over any other traffic and will not be degraded by any other data being transferred simultaneously.
- ii. The central Customer facility at the NOC shall have directly routed (no NAT) bidirectional IPv4 unicast connectivity with every transmitter site and every studio site.
- iii. All circuits shall have symmetrical forward and reverse data capacity.
- iv. The circuits for the real time data streams shall guarantee the bandwidth to be available and never compromised. The bitrates for the real time data streams are average speeds. The tenderer should allow for instantaneous bursts of data of up to 150% of the nominal data rate.
- v. The L3VPN network will have no direct connectivity with the public internet. Internet access may be separately provided to some sites but all traffic carried on the L3VPN network shall be internal data destined for another site on the Customer network.
- vi. Primary Transmitter Sites with diverse Layer 2 connections shall be capable of operating normally with either connection having a fault. Where there is a diverse Layer 2 circuit, the Supplier shall use all reasonable endeavours to achieve maximum commercial and physical diversity, including the use of multiple carriers, multiple carrier exchanges and physical fibre separation.
- vii. To allow for data connectivity to aid in fault diagnosis in the case of a circuit failure, all transmitter sites shall be supplied with a secondary data connection such as an ADSL circuit.
- viii. In order to improve system diversity, lines to transmitter sites with single line connectivity shall be configured with a shadow circuit presented on a separate port at the site to the main feed. The shadow virtual circuit shall be separately presented at the NOC from the main circuit and shall be diversely routed on the Layer 3 network from the main virtual circuit. The real time video feeds to the transmitter sites will be constantly present on both the main and shadow networks.
- ix. Every studio site shall have routed bidirectional IPv4 unicast connectivity with every other studio site.
- x. Studio sites shall not have direct routed IP connectivity with any transmitter sites.
- xi. The routers at Contribution Studio and BBC sites shall be equipped with network security such as a firewall and data port management in order to stop any unauthorised access.
- xii. Open protocols shall be used.

### 7.2. Service Levels

In order to provide the optimal environment for these real time data streams, Comux require a high network performance in terms of extremely low Packet Loss, Jitter and Delay.

Criteria	SLA Target
Packet Loss	<0.01%
Jitter	<5ms
Latency	<50ms
Availability	1+1 Diverse sites 100% Single circuit sites 99.95%

### 7.3. The NOC Site

The Comux NOC has an equipment room with dual protected power supplies, fire protection and environmental control. The tenderer will be able to locate their routing and network termination equipment within this equipment room.

The network shall be 1+1 fully diverse at the NOC, including incoming fibres and terminal equipment. Network capacity shall be sufficient to allow for all of the real time data streams to and from all of the remote sites.

In addition to the private network capacity, business class internet connectivity of 500Mbit/s download speed and minimum 100Mbit/s upload speed shall be provided making full use of the diverse infrastructure for high availability.

### 7.4. Terrestrial Transmitter Sites

All of the Freeview terrestrial transmitter sites used by Comux are currently owned and/or operated by Arqiva Limited ("Arqiva"). Tenderers should note that many of these sites are in very rural locations and confirmation should be made of the precise locations by using the Sitefinder application on the Arqiva website ([www.arqiva.com](http://www.arqiva.com)).

Comux's current network provider uses Layer 2 circuits at all of the transmitter sites (apart from Angus and Durris, which are provided by BT Global Media) using suppliers such as BT Openreach, BT Wholesale, Virgin Media and Vodafone.

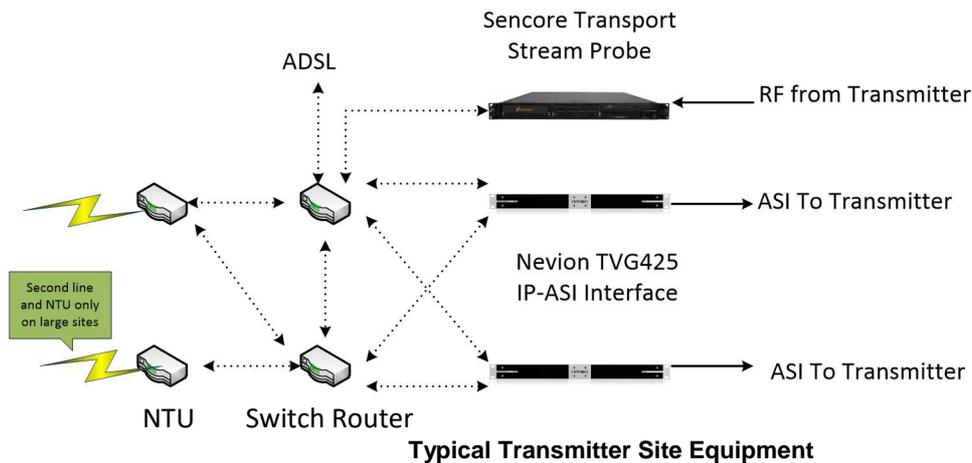
Tenderers should be accredited, or plan to become accredited, with the Arqiva Access Regulations to allow access to the transmitter sites for installation and maintenance. The tenderer should have key holder status with Arqiva in order to minimise costs for Arqiva supervision.

All the existing circuits are terminated in equipment racks in equipment rooms or in street cabinets within the site. Comux has installed cross site cabling at all of these sites to its transmitters and so it is expected that the Supplier would also terminate their circuits at the same locations within these sites in order to minimise costs.

The main and shadow data streams on single fibre sites shall be presented on separate ports of the network termination unit each being fed to a separate router. At the Primary 1+1 transmitter sites each NTU shall connect to a router. The routers shall be cross connected so that in the event of any loss of the main or reserve data stream a data feed will be available from both routers to the Comux IP-ASI interface units.

It should be assumed that appropriate equipment rack and power supplies will be provided by Comux.

The tenderer shall provide a method of remote power reset for the transmitter site router equipment, to reduce the need to send someone to site to perform an on-off reset. Other (non-transmitter) sites will normally be manned by Comux and so this facility would be preferable but non-essential.



### 7.5. Internet Contribution Studios

The Internet contribution studios do not connect to the network, but only connect to the Internet. Standard fibre-to-the building (or comparable) business grade Internet plans with symmetrical upload and download speeds of at least 50Mbit/s and guaranteed uncontended connectivity will be sufficient for these sites.

The Supplier should offer as an additional costed option a Standard business grade fibre-to-the-cabinet (or comparable) backup at each of these sites.

### 7.6. Remote site termination Equipment (excluding Internet Contribution Studios)

The tenderer shall provide appropriate routers at all sites, either single routers or 1+1 routers: 1+1 routers shall be provided at all transmitter sites and diversely connected Contribution Studios, single routers at all other sites.

In order to minimise the installed base of equipment on remote sites the network routers should also provide a network switch function to include a minimum of 8 ports per router for Comux use.

### 7.7. Installation and Commissioning

Arqiva transmitter sites are not normally manned so the tenderer will need to make access arrangements via Arqiva's Gateway access system. Studio sites will typically be manned during office hours to facilitate access.

Because of the real time nature of Comux's broadcast services it is essential that only short breaks occur during the changeover to the new network and Comux must be satisfied that the new network is stable and functioning correctly before changing over to it. Comux requests that tenderers propose methods for implementing the testing and commissioning of the new network that will minimise risk to Comux services. This should include a test lab facility and a phased changeover to the new network over a period of some months.

Comux can arrange for its equipment to be connected to the new routers when they have been installed on site.

## Schedule 1 Circuit Details

Comux reserves the right to modify the following circuit details during the tender process.

COMUX NOC							
Fully diverse 1+1 connectivity of sufficient capacity for all remote site network feeds to operate concurrently							
Managed Internet connectivity of 500Mbit/s download 100Mbit/s upload uncontended; available on both diverse paths							
Serving	Site	Postcode	Speed Mbit/s	Setup £	Annual £		Estimated Go Live
					Primary	Secondary	
Birmingham Network	Innovation Birmingham Campus, Aston, Faraday Wharf, Holt Street, Birmingham	B7 4BB					
Birmingham Internet	Innovation Birmingham Campus, Aston, Faraday Wharf, Holt Street, Birmingham	B7 4BB					
BBC Sites							
1 realtime 15Mbit/s data stream from each site to NOC							
All sites require capacity for management data connection to NOC in addition to real time streams							
Serving	Site	Postcode	Speed Mbit/s	Setup £	Annual £		Estimated Go Live
					Primary	Secondary	
BBC	Wood Lane White City London	W12 7TP					
Birmingham	BBC Wood Norton Evesham	WR11 4YB					
DISTRIBUTION NETWORK PRIMARY TRANSMITTER SITES 1+1 DIVERSE CONNECTIVITY							
All sites (except Manchester, Crystal Palace and Croydon): 2x realtime 15Mbit/s data streams to each site from NOC (1 per diverse path)							
Crystal Palace and Manchester: 6x realtime 15Mbit/s streams to each site from NOC (3 per diverse path)							
Croydon: 4x realtime 15Mbit/s streams to each site from NOC, (2 per diverse path)							
All sites require capacity for management data connection to NOC in addition to real time streams							
Serving	Site	Postcode	Speed	Setup	Annual £		Estimated Go-Live
					Primary	Secondary	
Birmingham	Transmitting Station Hill Village Road Sutton Coldfield	B75 5JJ					
Glasgow	Tower Black Hill	ML7 4NZ					
Leeds	Emley Moor SC Jagger Lane Emley Moor	HD8 9TQ					
London	Crystal Palace Arqiva Site Old Cople Lane Crystal Palace Parade Upper Norwood	SE19 1UE					
London	Croydon SOUTH NORWOOD HILL	SE25 6BQ					
Manchester Liverpool Preston	Winter Hill Winter Hill Service Centre Rivington Moor Horwich	BL6 6SL					
Newcastle	Pontop Pike Arqiva Site Pontop Pike Lane Dipton	DH9 9AT					

DISTRIBUTION NETWORK TRANSMITTER SITES SINGLE LINE CONNECTIVITY						
All sites except Reading: 2x realtime 15Mbit/s data streams to each site from NOC ; 1x Main and 1x shadow streams to be presented on separate outputs						
Reading: 4x realtime 15Mbit/s data streams to each site from NOC ; 2x Main and 2x shadow paths to be presented on separate outputs						
All sites require capacity for management data connection to NOC in addition to real time streams						
Serving	Site	Postcode	Speed	Setup £	Annual £	Estimated Go-Live
Aberdeen	Durris Durris Service Centre Cryne Corse Road Off Slug Road Banchory	AB31 6DH				
Belfast	Divis Arqiva Site 17 Divis Road Hannahstown	BT17 0NG				
Birmingham	Arqiva Site Amblecote Road Brierley Hill	DY5 2PP				
Brighton	Arqiva Site Whitehawk Hill Road Whitehawk Hill	BN2 0AH				
Bristol	Arqiva Mendip Transmitting Station Pen Hill Mendip	BA5 3LB				
Cambridge	Madingley Arqiva Site Sain Neots Road Comberton Cambridge	CB23 8AG				
Cardiff	Arqiva Site Saint Lythan's Down Wenvoe	CF5 6BQ				
Carlisle	Caldbeck Maintenance Centre Brocklebank Caldbeck	CA7 8DW				
Dundee	Angus Arqiva Site Gallow Hill Balcalk Farm Tealing	DD4 0RG				
Edinburgh	Arqiva mast The Binns Craigkelly	KY3 0AJ				
Grimsby	Arqiva Transmitting Station Near to Belmont House Benniworth Belmont	LN8 6JT				
Guildford	GUILDFORD HOGS BACK Arqiva Site Hogs Back Sunnydown	GU3 1DA				
Middlesborough	Bilsdale Arqiva Site Chop Gate Bilsdale West Moor	TS9 7JU				
Mold	Moel-y-Parc Maintenance Centre Bryn Yr Eithin Road	CH7 5UU				
Norwich	Arqiva Site High Park Wood Tacolneston	NR16 1DW				
Nottingham	Arqiva Site Garthorpe Lane Waltham-on-the- Wolds Waltham	LE14 4AF				
Nottingham	Nottingham Arqiva Transmitting Station Swingate Strelley	NG16 2SU				
Oxford	Oxford Arqiva Site New Road Beckley	OX3 9ST				
Reading/ Basingstoke	Arqiva Site Cottington Hill Hannington	RG26 5UD				
Salisbury	Salisbury Arqiva Site Harnham Wood Old Blandford Road	SP2 8BU				

Scarborough	Arqiva Site Oliver's Mount Scarborough	YO11 2UG					
Sheffield	Sheffield Arqiva Site Lydgate Reservoir Evelyn Road Tapton Hill Sheffield	S10 5FG					
Southampton	Rowridge Arqiva Site Rowridge Lane	PO30 4HT					
Swansea	Kilvey Hill Arqiva Site Kilvey Hill St Thomas	SA1 8ED					
York	BILBROUGH YORKSHIRE WATER	YO23 3PF					
<b>CONTRIBUTION STUDIOS - SINGLE LINE CONNECTIVITY</b>							
1x 40Mbit/s realtime data stream JPEG video							
All sites require capacity for management data connection to NOC in addition to real time streams							
<b>Serving</b>	<b>Site</b>	<b>Postcode</b>	<b>Speed</b>	<b>Setup £</b>	<b>Annual £</b>	<b>Estimated Go-Live</b>	
Belfast	Northern Visions 23 Donegall Street BELFAST	BT1 2FF					
Brighton	14-17 Manchester Street Brighton	BN2 1TF					
Kent	University of Kent Medway building Chatham Maritime Kent	ME4 4AG					
Nottingham	Confetti 6-10 Convent Street NOTTINGHAM	NG1 3LL					
Sheffield	Sheffield Live 15 Paternoster Row SHEFFIELD S1 2BX	S1 2BX					
London ES A	Building 1 Chiswick Park 566 Chiswick High Road LONDON	W4 5BE					
London ES B	Telehouse North Connection to Exponential E network	E14 2AA					

CONTRIBUTION STUDIOS 1+1 FULLY DIVERSE CONNECTIVITY							
Encompass: 10x 50Mbit/s data stream from site to NOC; (5 per diverse path)							
Leeds Studio: 16x 50Mbit/s data stream from site to NOC; (8 per diverse path)							
Newman St: 10x 50Mbit/s data stream from site to NOC; (5 per diverse stream)							
All sites require capacity for management data connection to NOC in addition to real time streams							
Serving	Site	Postcode	Speed	Setup £	Annual £		Estimated Go-Live
					Primary	Secondary	
Encompass	One each at Telehouse North and Telehouse East Connection to Encompass network	E14 2AA					
Leeds Studio	The Leeds Media Centre 21 Savile Mount LEEDS	LS7 3HZ					
Newman St	Arqiva 64 Newman St London	W1T 3EF					
INTERNET CONTRIBUTION STUDIOS							
Primary: 50Mbit/s Uncontended symmetrical Internet connection							
Optional Secondary: Business Broadband with approx 50Mbit/s upload							
Serving	Site	Postcode	Primary		Optional Secondary		Estimated Go-Live
			Setup £	Annual £	Setup £	Annual £	
Salisbury	Enterprise House, Cherry Orchard Lane, Salisbury,	SP2 7LD					
Carlisle	Unit 36, Carlisle Enterprise Centre, James Street, Cumbria,	CA2 5BB					
York	That's TV 2A Kettering Lane Clifton Moor York	YO30 4XF					
Salford	Waters Edge Business Park, Mowden Road, Salford,	M5 3EZ					
Reading	Broad Street Mall, Reading,	RG1 7QR					
Glasgow	That's TV, Unit 2-2 12 Renfield St. Glasgow	G2 5AL					
Cambridge	That's TV The Bike Depot 140 Cowley Rd. Cambridge	CB4 0DL					
Norwich	That's TV Prospect House Rouen Rd. Norwich	NR1 1RE					

An excel spreadsheet version of this Schedule is available to download from the link below:  
<https://comux.co.uk/admin/wp-content/uploads/2019/06/Schedule-1-Circuit-Details.xlsx>