



COLT LANLink

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Overview

The COLT LANLink portfolio of services enables you to interconnect your Ethernet or ATM local area networks (LANs) so that you can operate your various company sites as a single office, reducing your costs and increasing efficiency. Ethernet is de facto the industry standard protocol within the LAN and COLT LANLink enables you to extend Ethernet into metropolitan and wide area networks (MANs and WANs).

You can connect LANs within the same city (LANLink Metro), within the same country (LANLink National) or between countries (LANLink International). Connections are made via Ethernet, the most widely used LAN technology. A fourth option, the COLT LANLink Hub and Spoke service, enables you to aggregate LANLink Metro, National and International services onto a single Ethernet interface at a single site.

In Europe, the COLT network links our own fibre-optic Metropolitan Area Networks (MANs) in 32 cities across 13 countries, with additional coverage in a further 42 towns and cities. COLT's ability to provide end-to-end connections over our own infrastructure ensures that we can offer customers a high-quality, cost-effective solution, backed by comprehensive service level agreements (SLAs) and award-winning customer support.

Benefits

- > **Ethernet interface:** Ethernet is a widely accepted and easy-to-run protocol. All of the LANLink services provide you with an Ethernet interface, which enables you to extend Ethernet across your WAN and helps to reduce the total cost of ownership of your network.
- > **Single network:** LANLink services provide a single network for all traffic types – voice, data and video. This integration of networks facilitates improved efficiency and manageability.
- > **Single supplier relationship:** As COLT is able to offer LAN services on a Metro, National and International basis, we can simplify your telecommunications arrangements by offering you one supplier for all your network needs and one local relationship for Europe-wide service delivery.
- > **Scalability:** You can quickly upgrade or downgrade your bandwidth requirements to suit your changing business and application needs. LANLink services offer virtually unlimited capacity to meet your bandwidth demands, regardless of the size of your enterprise.
- > **Bandwidth granularity:** The LANLink services that are delivered using Ethernet over SDH are not constrained by the bandwidth limitations of SDH. This means that COLT is able to offer a granular service, enabling you to purchase only the bandwidth you require.
- > **Legacy protocol support:** The COLT LANLink services are Layer 2 technologies and as such are transparent to the protocols operating in your network and the data sent across the COLT network, enabling the support of Layer 3 legacy protocols.
- > **Multiple circuits over a single access port:** You do not require multiple interfaces or equipment. The access port can be logically separated into a number of virtual circuits.
- > **Integrated voice, video and data over a single physical access:** COLT's point-to-point Ethernet services are transparent services, so you can use them to deliver various applications over a single physical access.
- > **Built-in resilience:** The LANLink services that are delivered using SDH benefit from the in-built resilience of SDH. Metro services that are delivered using ADVA can be protected as an optional extra, using diversely routed fibres and hot standby protection on the equipment.
- > **Security:** COLT LANLink services are fully secure. They are provided over COLT's wholly owned, state-of-the-art fibre network, ensuring that your traffic is totally secure from malicious attack. Service features such as dedicated vLAN provide end-to-end security and integrity.
- > **Service level agreements (SLAs):** COLT provides market-leading SLAs with compensation to back up targets for delivery, availability and time to repair.
- > **Continuous service management:** As the COLT network, LANLink National and LANLink International are wholly owned, built and managed by COLT, we take full responsibility for the delivery of your service 24 hours a day, 7 days a week, 365 days a year.

Description

COLT network

COLT has a long-distance European transmission network which spans over 20,000 kilometres of fibre-optic infrastructure laid in protective ducts that are wholly owned and managed by COLT.

The COLT network links up COLT's city networks which have over 10,000 buildings directly connected by COLT local fibre-optic infrastructure in 13 countries across Europe. These countries are: Austria, Belgium, Denmark, Republic of Ireland, France, Germany, Italy, Netherlands, Portugal, Spain, Sweden, Switzerland and the UK. There is also a node in New York which is connected to the European network via 2.5Gb transatlantic links.

As standard, all COLT LANLink services are available between COLT-connected sites. Off-net service may be possible – ask your COLT contact for availability.

Network access

COLT LANLink services connect your premises to COLT's wholly owned fibre-optic infrastructure. Depending on the location and the speed you require, sites can be connected using different access methods.

If a site cannot be directly connected by COLT, we will provide the connection from the COLT SDH or DSL node to your building(s) using a local carrier.

LANLink Metro

LANLink Metro connects your LANs within a single city. It is a full duplex protocol-independent service, which means you can use the full amount of the bandwidth supplied, in either direction. LANLink Metro is a point-to-point service that supports dedicated connectivity between any two sites that are directly connected to the COLT network. The service can be delivered using dedicated fibre or Ethernet over SDH.

Connections are available at speeds from 2 Mbps to 1 Gbps and can be provisioned with or without protection (see the section 'Resilience' for details of how links are protected). For off-net requirements, COLT will perform a feasibility study prior to any agreement.

Table 1 shows the standard geographic availability for LANLink Metro, as well as the full list of available bandwidths. The interfaces that are available with LANLink Metro are shown in the Technical Specifications section at the end of this document.

The countries marked with ✓ are available on a standard basis. Conversely, where it shows X the service is not available on a standard basis and a further feasibility study will be required to establish whether COLT can meet your requirements. Ask your COLT contact for full details.

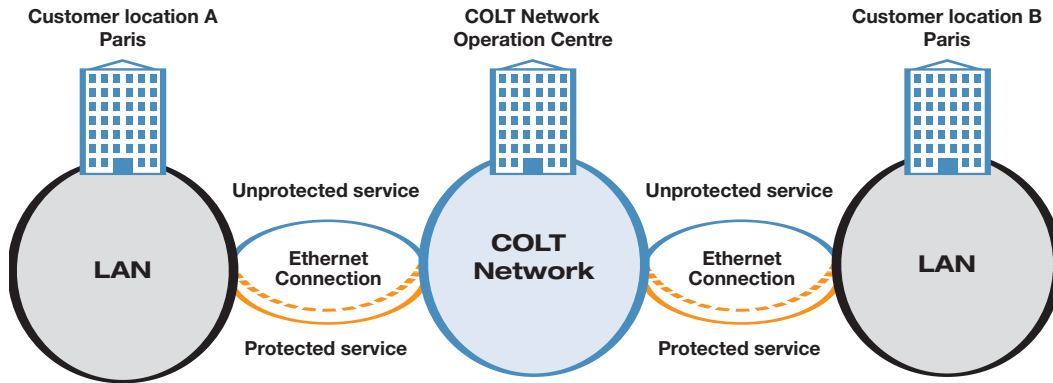
Table 1: Geographic availability for LANLink Metro

Product		DE	AT	BE	DK	FR	CH	IE	ES	SE	PT	UK	NL	IT
COLT LANLink Metro	2Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	4Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	6Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	8Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	10Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	10Mbps Unprotected	✓	✓	✓	X	✓	✓	✓	✓	X	✓	✓	X	✓
COLT LANLink Metro	15Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	20Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	25Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	30Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	40Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	50Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	60Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	75Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	90Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	100Mbps Protected	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COLT LANLink Metro	100Mbps Unprotected	✓	✓	✓	X	✓	✓	✓	✓	X	✓	✓	✓	✓
COLT LANLink Metro	155Mbps Protected	X	X	✓	X	✓	✓	✓	✓	X	✓	✓	X	✓
COLT LANLink Metro	155Mbps Unprotected	X	X	✓	X	✓	✓	✓	✓	X	✓	✓	X	✓
COLT LANLink Metro	622Mbps Protected	✓	✓	✓	X	✓	✓	✓	✓	X	✓	✓	X	✓
COLT LANLink Metro	622Mbps Unprotected	✓	✓	✓	X	✓	✓	✓	✓	X	✓	✓	X	✓
COLT LANLink Metro	1Gbps Protected	✓	✓	✓	X	✓	✓	✓	✓	X	✓	✓	✓	✓
COLT LANLink Metro	1Gbps Unprotected	✓	✓	✓	X	✓	✓	✓	✓	X	✓	✓	✓	✓

Note: For Italy, a resource check will have to be performed before any agreement.

Figure 1 below shows how two of your sites, located within the same metro area, can be connected using LANLink Metro.

Figure 1: Example of a LANLink Metro connection



LANLink National and International

COLT LANLink National and COLT LANLink International services enable the Layer 1 transparent delivery of Ethernet frames over SDH between COLT on-net buildings (eg vLAN transparency). It enables you to

connect your LANs within a single country or between two different countries.

The service delivers one of the following ports to your Customer Premise Equipment (CPE) operating at a variety of bandwidth throughput options:

- > 10BaseT
- > 100BaseT
- > 1000Base LX/SX

LANLink National's availability is given in Table 2 below. See 'Appendix 1: Technical specifications' for additional information on the service interfaces and bandwidths.

Table 2: Geographic availability for LANLink National

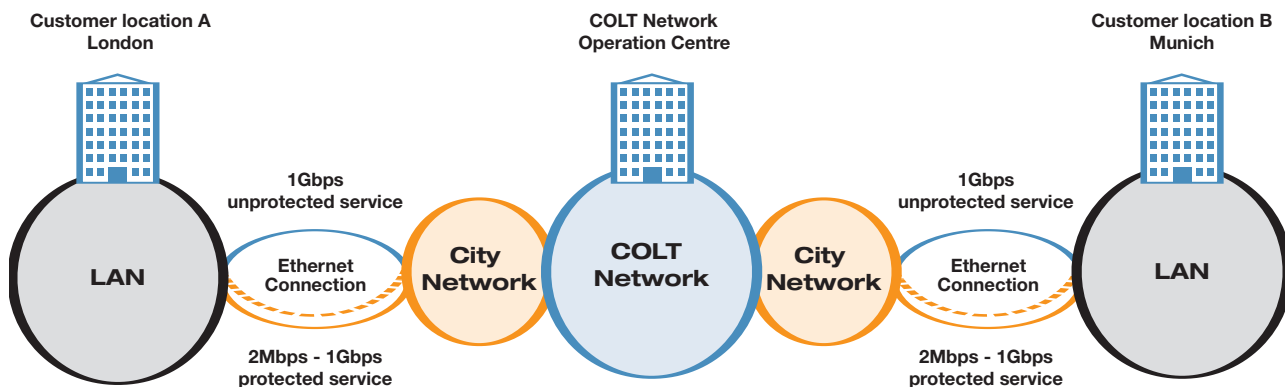
Product	DE	AT	BE	DK	FR	CH	IE	ES	SE	PT*	UK	NL	IT
LANLink National 2Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 4Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 6Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 8Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 10Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 15Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 20Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 25Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 30Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 40Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 50Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 60Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 75Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 90Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 100Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 10Mbps	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 1Gbps Protected	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓
LANLink National 2Gbps Unprotected	✓	X	✓	X	✓	✓	X	✓	X	X	✓	✓	✓

Note: * in Portugal, although COLT can not provide LANLink National on a standard basis, alternative solutions can be implemented. Ask your COLT contact for full details.

LANLink International is available to and from all COLT operating countries. For national or international off-net requirements, COLT will perform a feasibility study prior to any agreement. Ask your COLT contact for full details

Figure 2 below shows an example of two sites, located in London and Munich, connected using LANLink International. Although not illustrated here, LANLink National is delivered using the same point-to-point topology as LANLink International.

Figure 2: Example of a LANLink International connection



LANLink Hub and Spoke

LANLink Hub and Spoke enables you to aggregate Ethernet services onto an Ethernet interface at a single site. The service can be made up from LANLink Metro, National and International services – all being terminated at a hub site.

The Hub and Spoke service is delivered using Ethernet over SDH technology. It is a Layer 2 private network service that comprises several Ethernet Virtual Private Line (EVPL) links between one hub site and several spoke sites.

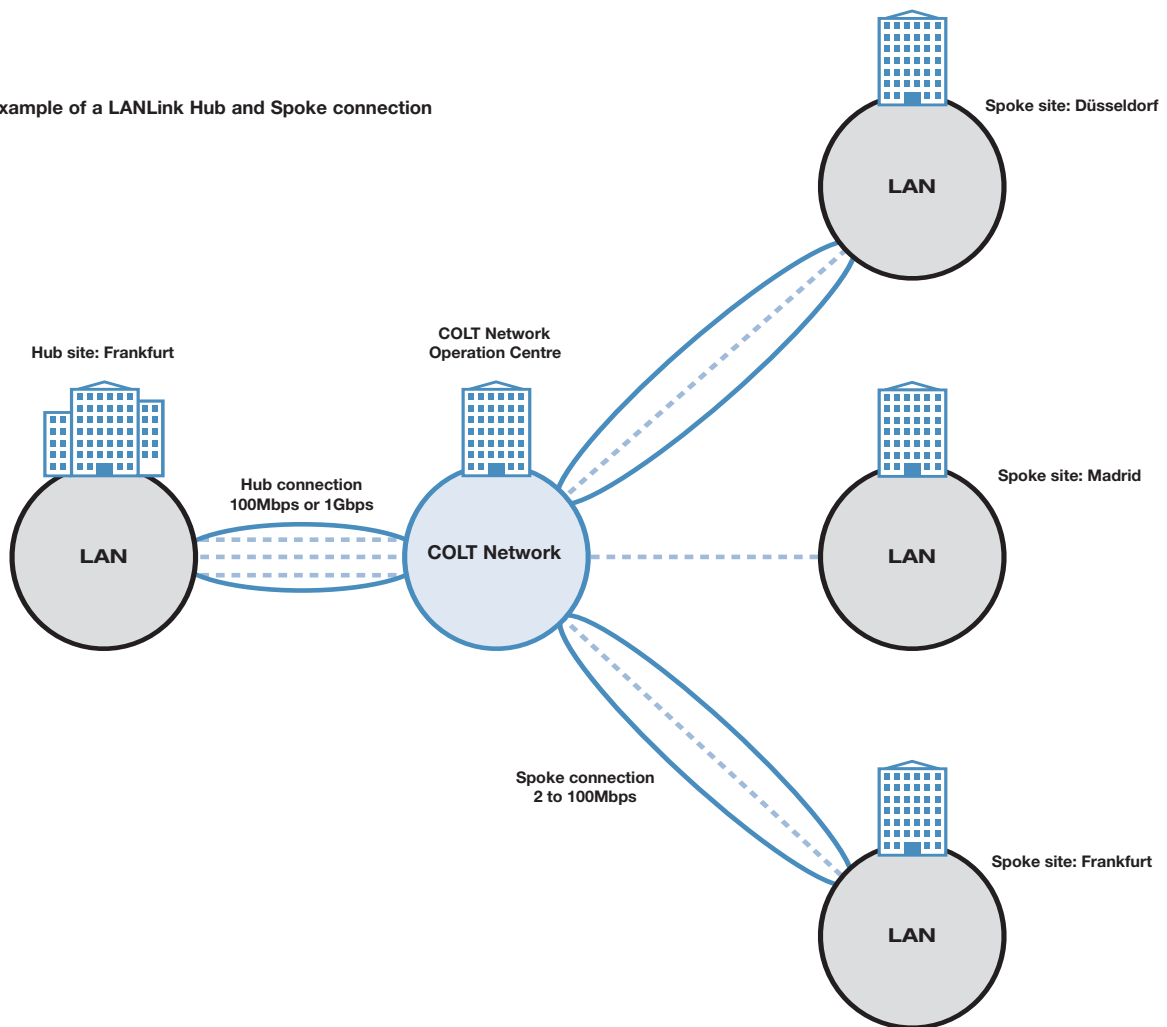
The multiplexing of the spoke services is done at the hub site over a single

Ethernet interface. You can choose between two hub options – Fast Ethernet or Gigabit Ethernet presentation. The IEEE standard 802.1Q VLAN Tagging is used for service segregation between the spoke sites on the single hub interface. You can allocate a vLAN tag to each spoke site when you order the service. When a new spoke is added to the network, a physical SDH point-to-point link is configured on the COLT SDH network between the hub site and the new spoke site. The point-to-point connections are made up of one or several SDH Virtual Containers that have been virtually concatenated within the COLT SDH network.

LANLink Hub and Spoke is available in all COLT operating countries.

Figure 3 below shows how four of your sites, located in different countries, can be connected using LANLink Hub and Spoke. In this specific example, all the connections are terminated at the customer hub site in Frankfurt.

Figure 3: Example of a LANLink Hub and Spoke connection



Extended coverage

COLT LANLink services can also be provided to customer sites not directly connected to the COLT network, using a mixture of COLT and third-party other licensed operator (OLO) infrastructure and services. These are integrated seamlessly and provide numerous customer benefits such as simplified management and provisioning, network transparency and single point of contact. Both OLO SDH and Ethernet services may be used. These can be implemented as part of point-to-point or hub and spoke topologies and are included within COLT's service level agreement.

COLT LANLink services may be provided over DSL at speeds from 256kbit/s to 4Mbit/s. Wholesale DSL and unbundled local loop (ULL) DSL symmetric infrastructure is used. Delivered with an Ethernet interface, these services are available in the metropolitan area, nationally and internationally for point-to-point or hub and spoke configurations. DSL services are unprotected and monitored 24 hours a day, seven days a week.

Technical platforms

Where LANLink Metro services are delivered using dedicated fibre, the ADVA FSP500 platform is used. Based on the ADVA platform, the following services can be delivered:

- > unprotected LANLink Metro services at 10 Mbps, 100 Mbps, 155 Mbps, 622 Mbps and 1 Gbps
- > protected LANLink Metro services at 155 Mbps, 622 Mbps and 1 Gbps

Where COLT LANLink Metro, National and International services are delivered via Ethernet over SDH, a Lucent platform will be used. A Lucent AMS multiplexer will be installed on the customer site at each end of the link – this is a standard STM-1 multiplexer that can also be used for the delivery of standard SDH services.

Ethernet services: Your data is transported in VC-12 virtual containers over the COLT network. Each VC-12 transmits at 2 Mbps.

Fast Ethernet services: Your data is transported in VC-3 virtual containers over the COLT network. Each VC-3 transmits at one third of 155 Mbps (around 52 Mbps).

Gigabit Ethernet services: Your data is transported in VC-4 virtual containers over the COLT network. Each VC-4 transmits at 140 Mbps.

See the section on Technical Specifications at the end of this document for details of bandwidth options and interfaces.

Resilience

Depending on the location, area and circuit speed, COLT offers two LANLink service options: protected or unprotected.

All LANLink Metro, National and International services that are provided via Ethernet over SDH are protected by the ring resilience of SDH.

If you have a LANLink Metro service that is delivered using dedicated fibre, two fibre pairs are deployed over the COLT network. In the unlikely event that the primary link fibre fails, your traffic is automatically switched over to the second link. The cut-over is enabled by a hot standby protection card in the COLT terminating equipment at both ends of the circuit. Cut-over time is less than 50 ms.

Resilience can also be provided via dual entry into your sites, subject to site survey and additional cost.

Security

With the COLT LANLink services, it is impossible for another customer to intercept or send data from or to any of your sites via their own access. This is because the services are Layer 1 separated.

The physical security of our buildings is based on defined internal standards according to the operations housed within each building and access is strictly controlled.

All areas within COLT buildings are secured by means of an electronic access control system to ensure that only authorised personnel can gain entry. All personnel must hold an appropriate pass card while on COLT premises. Non-COLT personnel are not allowed on COLT premises except by prior appointment, with arrangements made for entry and a COLT host to vouch for them, or verification by the security guard in guarded buildings.

Demarcation point

The demarcation point for COLT services is the customer interface at the COLT access equipment (normally at the base of the COLT cabinet). If you require in-house cabling from the COLT cabinet to your equipment, COLT will charge for this service.

If COLT installs cabling on your behalf, the demarcation point remains the same, ie the base of the COLT cabinet – COLT is not responsible for fault-finding on the in-house cabling.

Service management

The COLT LANLink services are fully network managed as standard. This enables COLT to provide you with a superior level of service, through fault handling processes and remote software upgrades. The COLT network management centres in all the COLT operating cities provide support for

customer fault reporting and service requests 24 hours a day, 365 days a year. You will be given contact details with your service documentation.

If a failure does occur, we will keep you updated with regular progress reports until we confirm to you that the problem is resolved.

COLT offers industry-leading service level agreements (SLAs) with the COLT LANLink services. If specified targets for service delivery, availability and fault repair are not met, you will qualify for financial compensation. Ask your COLT contact for full details of our SLAs.

Customer service

COLT has a high quality European fibre network, which enables us to provide you with an annual target service availability. The target availability depends on the service taken (Metro, National or International) and location of your sites. We monitor our services 24 hours a day, 365 days a year and usually fix faults before they affect service, but if you do need to report a fault then we have help desks in every European country where COLT has a presence. You can report a fault at any time. Full details can be found in the service level agreement for COLT LANLink.

Charges and billing

You can choose to be billed by COLT monthly, quarterly or annually for your LANLink services. Bills are available on paper or CD-ROM. Your bill will detail:

> service installation charges, invoiced in full on the first bill after installation. This will usually be within 30 days of service delivery. Other one-off charges such as moves and changes, will also be invoiced in full on the next available bill

- > service rental charges, invoiced monthly, quarterly or annually in advance. If no preference is indicated, monthly billing will be set as the default
- > any other charges or credits
- > discounts, where applicable

Technical specifications

Bandwidth Options ¹	Protected/ Unprotected ²	Delivery over dedicated fibre/SDH/DSL	Interface Type	Connectors
256 Kbps	Unprotected	DSL	10/100Base-T	RJ45 ³
512 Kbps	Unprotected	DSL	10/100Base-T	RJ45 ³
1 Mbps	Unprotected	DSL	10/100Base-T	RJ45 ³
2 Mbps	Unprotected	DSL	10/100Base-T	RJ45 ³
2 Mbps	Protected	SDH	10/100Base-T	RJ45 ³
4 Mbps	Protected	SDH	10/100Base-T	RJ45 ³
4 Mbps	Unprotected	DSL	10/100Base-T	RJ45 ³
6 Mbps	Protected	SDH	10/100Base-T	RJ45 ³
8 Mbps	Protected	SDH	10/100Base-T	RJ45 ³
10 Mbps	Protected	SDH ⁵	10/100Base-T	RJ45 ³
15 Mbps	Protected	SDH	100Base-T	RJ45 ³
20 Mbps	Protected	SDH	100Base-T	RJ45 ³
25 Mbps	Protected	SDH	100Base-T	RJ45 ³
30 Mbps	Protected	SDH	100Base-T	RJ45 ³
40 Mbps	Protected	SDH	100Base-T	RJ45 ³
50 Mbps	Protected	SDH	100Base-T	RJ45 ³
60 Mbps	Protected	SDH	100Base-T	RJ45 ³
75 Mbps	Protected	SDH	100Base-T	RJ45 ³
90 Mbps	Protected	SDH	100Base-T	RJ45 ³
100 Mbps	Protected	SDH ⁶	100Base-T	RJ45 ³
1 Gbps ⁴	Protected	Fibre	1000BaseLX, single mode, 1.310 nm 1000Base SX multi-mode 850 nm	SC, ST, FC/PC
1 Gbps ⁴	Unprotected	Fibre	1000BaseLX, single-mode, 1.310 nm 1000Base SX multi-mode 850 nm	SC, ST, FC/PC

Additional bandwidth options for LANLink Metro:

10 Mbps	Unprotected	Fibre	10/100Base-T	RJ45 ³
100 Mbps	Unprotected	Fibre	100Base-T	RJ45 ³
155 Mbps	Protected	Fibre	Optical: Singlemode 1310nm	SC, ST, FC/PC
155 Mbps	Unprotected	Fibre	Optical: Singlemode 1310nm	SC, ST, FC/PC
622 Mbps	Protected	Fibre	Optical: Singlemode 1310nm	SC, ST, FC/PC
622 Mbps	Unprotected	Fibre	Optical: Singlemode 1310nm	SC, ST, FC/PC

1. Please check local availability with your COLT contact.
2. All Hub and Spoke connections, at all speeds, are protected.
3. Interfaces: In accordance with the standard IEEE 802.3, the physical interface is a female RJ45 connector (1/2 RX, 3/6 TX).
4. Not available for Spoke connections.
5. Protected 10Mbps services could be delivered over dedicated fibre.
6. Protected 100Mbps services could be delivered over dedicated fibre.