MPLS Services Framework Agreement

Annex II

Service Description

Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT

SERVICE DESCRIPTION

Date	29 th February 2016
Version n°	V5.0
Référence Colt	SERVICE DESCRIPTION
Référence CLIENT	XBID

Contacts :

Account Manager : ███████████████

███████████████

Solution Architect : ███████████████

███████████████

Sales Director ███████████

███████████████

Web: **www.colt.net**

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CONTENT

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1 Introduction

Following XBID's decision to deploy an MPLS solution, this document centralized the technical element of this service.

Into the context of the XBID project , Colt recommends IP VPN Plus that will offer following benefit :

- End to end solution entirely designed and operated by Colt, end-customers can focus on their business
- End to End SLA for service enclosing transport layer   and IP layer from a single supplier
- A single point of contact for all the network related request
- Flexibility of IP routing protocol to implement automated failover mechanism if needed
- End to end performance monitoring for latency and jitter criteria

This proposal replaces all other technical documentation (word proposal, mails).

2 Colt's Solution for the XBID project.

Colt proposes a very high resilient MPLS based IP VPN network to connect all the transaction sites of the XBID members. This Wide Area Network (WAN) solution is based on Colt IP VPN Plus product.

Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT
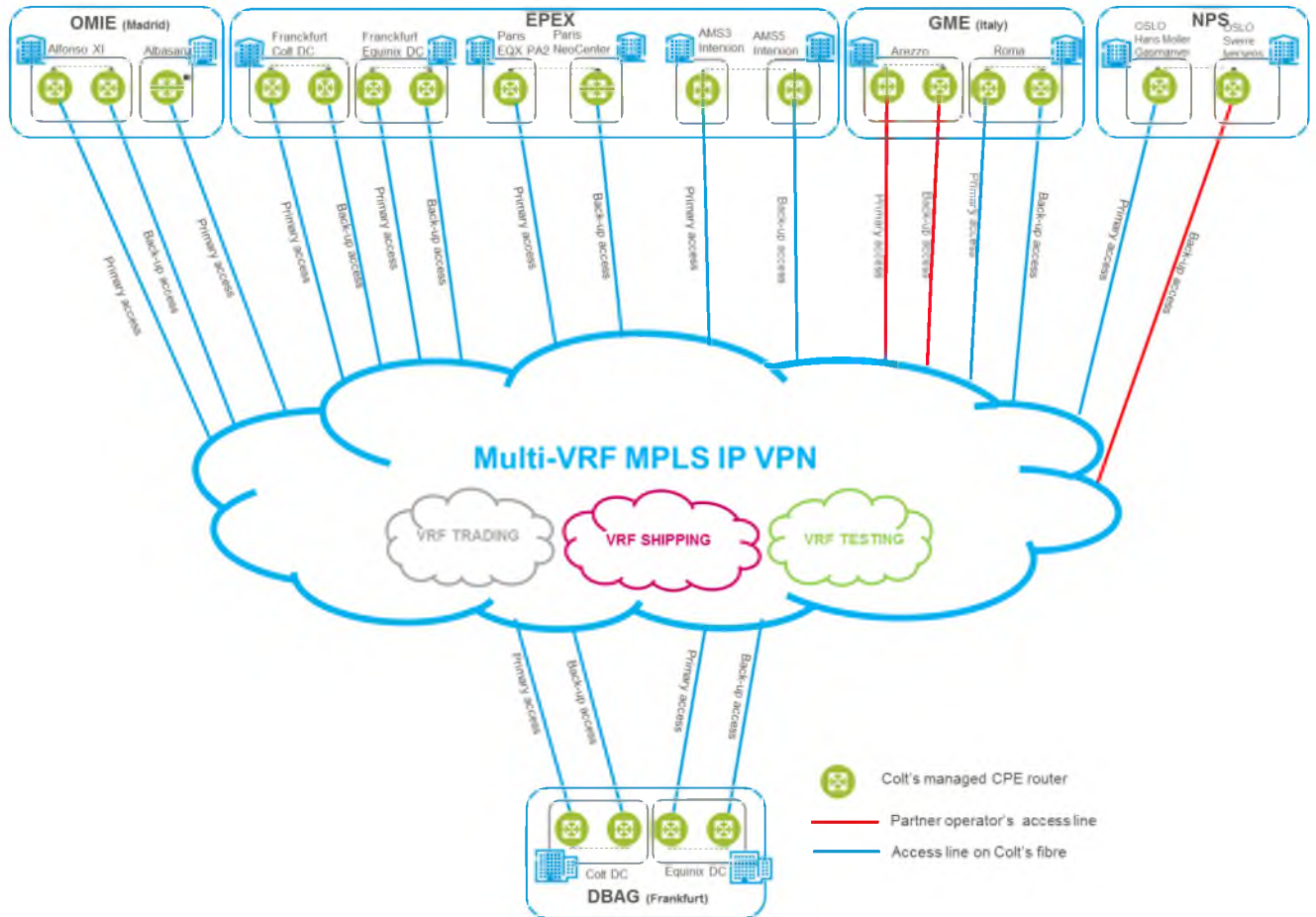
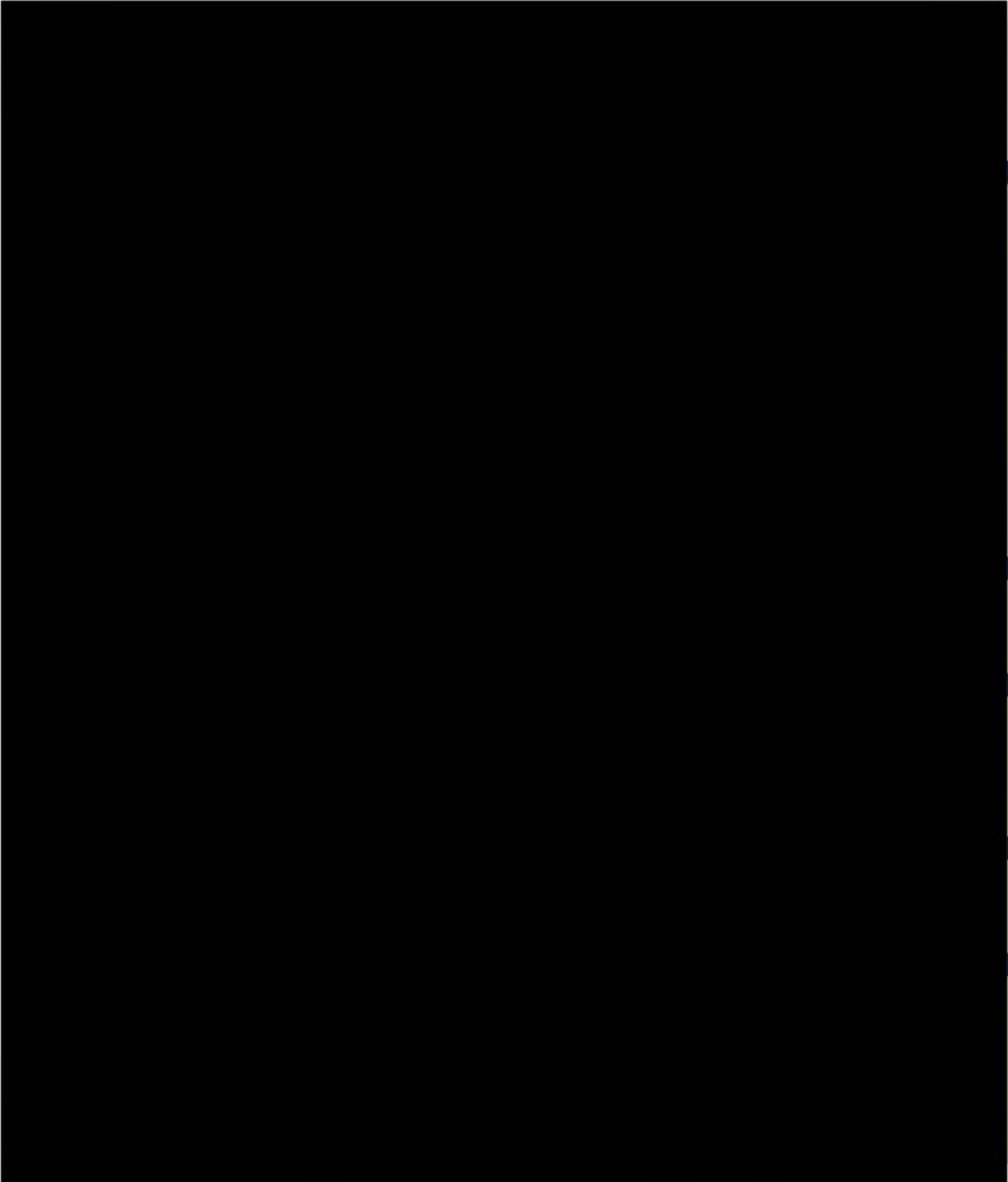**Proposed Colt's WAN high level architecture for XBID**

The detailed site proposal is:

Please note that the ROME site is currently off net and colt will deploy new fiber to make this site on-net.

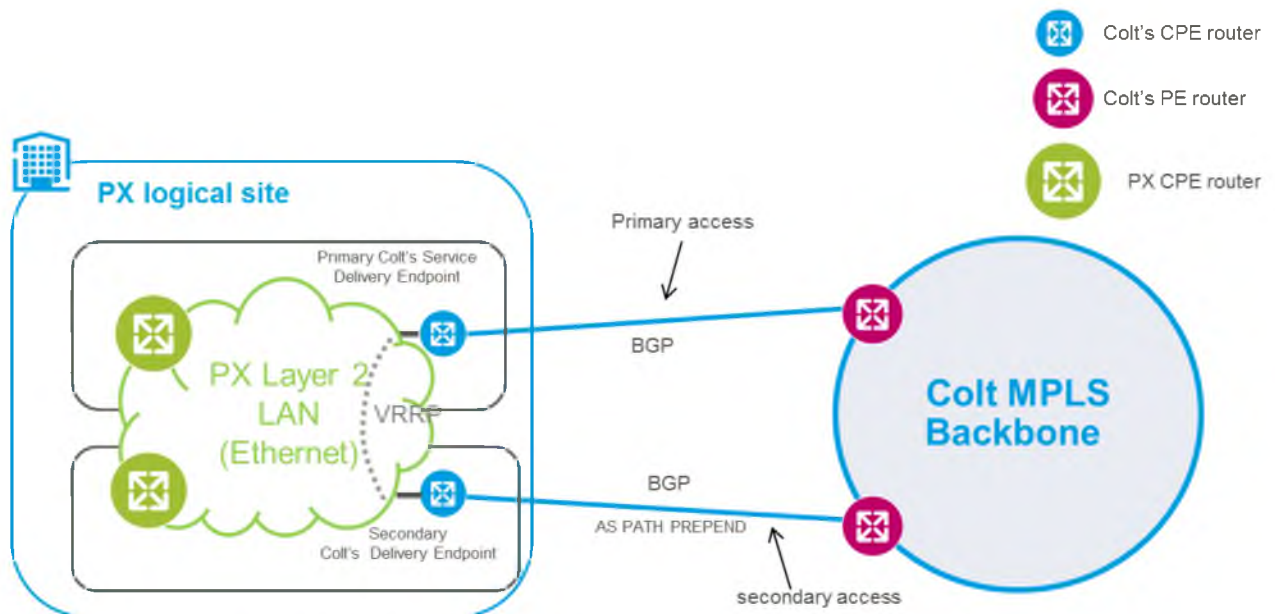| Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT

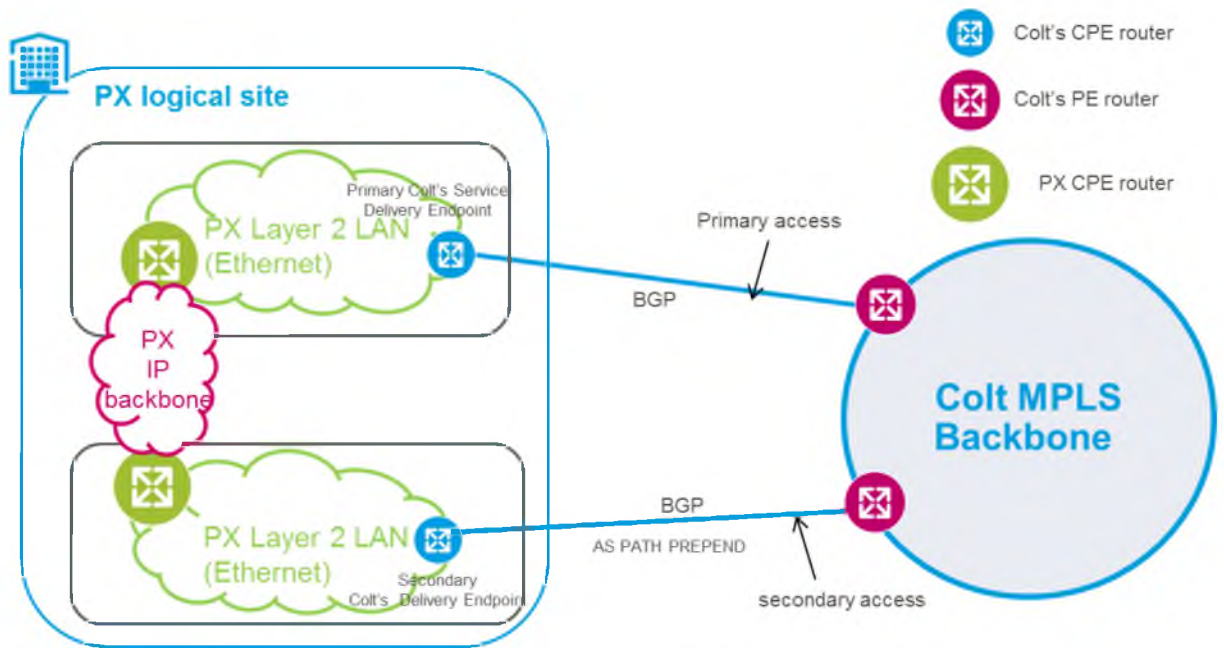| Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT

This WAN solution proposed by Colt offers:

- A End to End managed solution. We included an option in the financial offer for different routers which can give the requested flexibility. With this option, when the service is delivered via Colt's fiber, the customers will have the possibility to upgrade rapidly the bandwidth.

- The Cos can be implemented if needed but has not been chosen.

- A Point to Multi-point topology also called Hub and Spoke topology : all the spoke sites (sites hosting Trading Solution) will be able to communicate with the XBID central site (Hub) hosted into DBAG datacenter but won't be allowed to communicate together.

- Connectivity in dual-access when this design is chosen by PXs, with automated failover mechanism between the primary service and the back-up service. In normal working there will be one active access and one stand-by access. This function can be performed between two routers on the same site or between two routers on different sites as far as the connection is established as described in one of the two following two scenarios.

Dual Access architecture with static routing handover.

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Dual Access architecture with dynamic routing handover.

- Support of Multi-VPN. Possibility to implement a VRF(Sub-VPN) dedicated to trial purpose.

- <u>Best-in class SLA :</u>

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- Performance monitoring via on-line Colt portal.

- Pro-active monitoring and pro-active notification in case of incident.

For LAN routing hand-off each XBID member will indicate to Colt which type of routing is preferred among static routing or dynamic routing (BGP, OSPF, EIGRP).

Colt noted that the various logical site of XBID members are dual homed : they are made of 2 separate physical sites or rooms. Colt will not supply the layer 2 connectivity between these 2 physical sites .

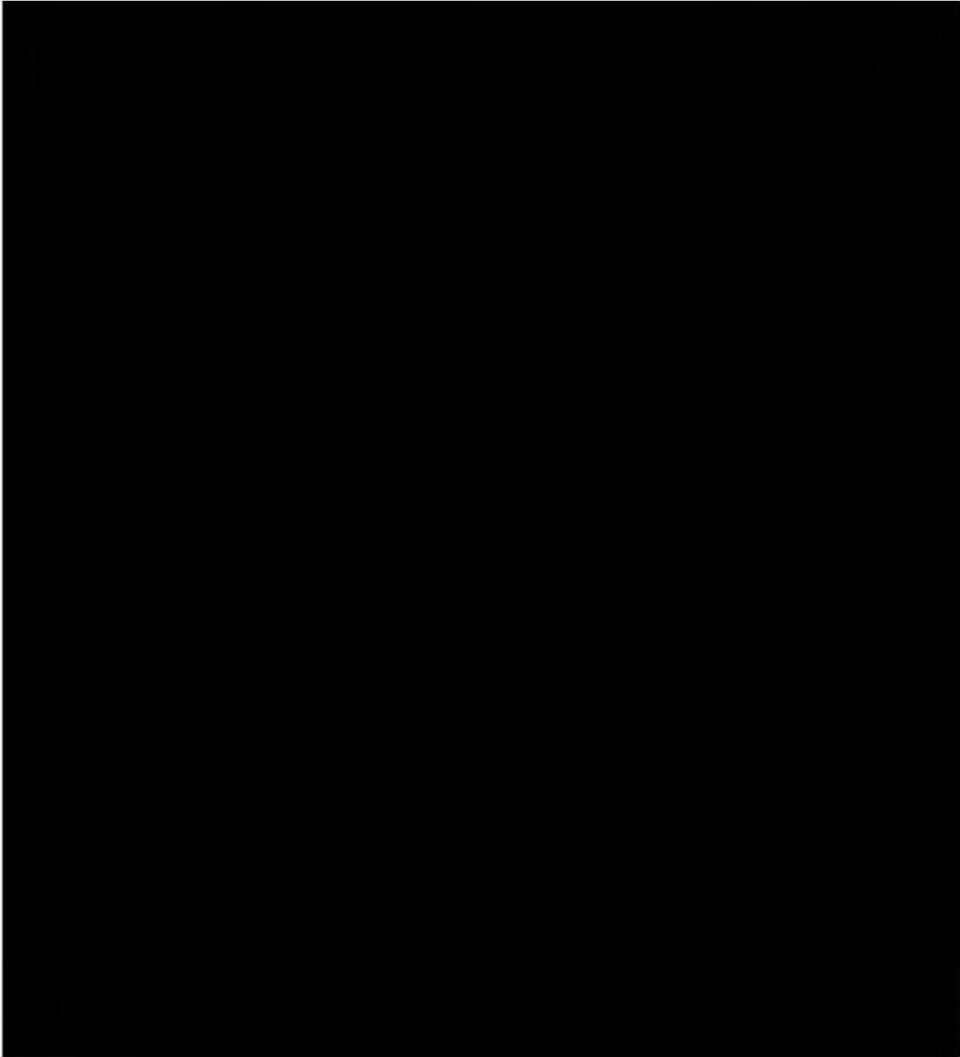## Site Connectivity

The table below indicate the sites connected to the Colt fibre ("on-net" sites)

This table is taken into account for the financial models.

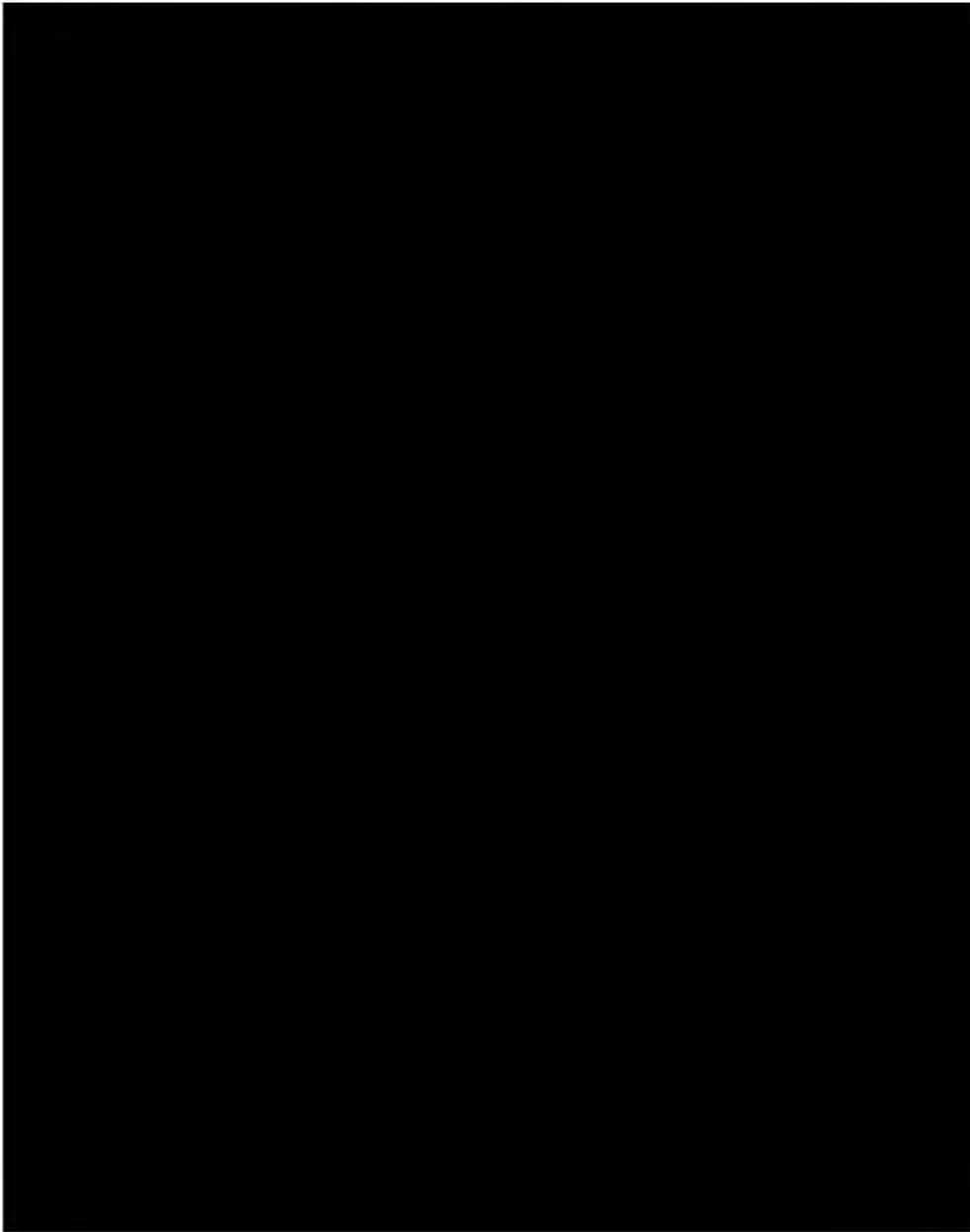| Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT

Note that each access with Colt fibre will benefit natively from fibre path protection, see section 5.1 Colt Fibre.

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Latency and Jitter

Considering site locations, Colt can guarantee that round trip delay between the Hub site and a spoke site will be under 60 ms. Jitter will be under 10 ms.
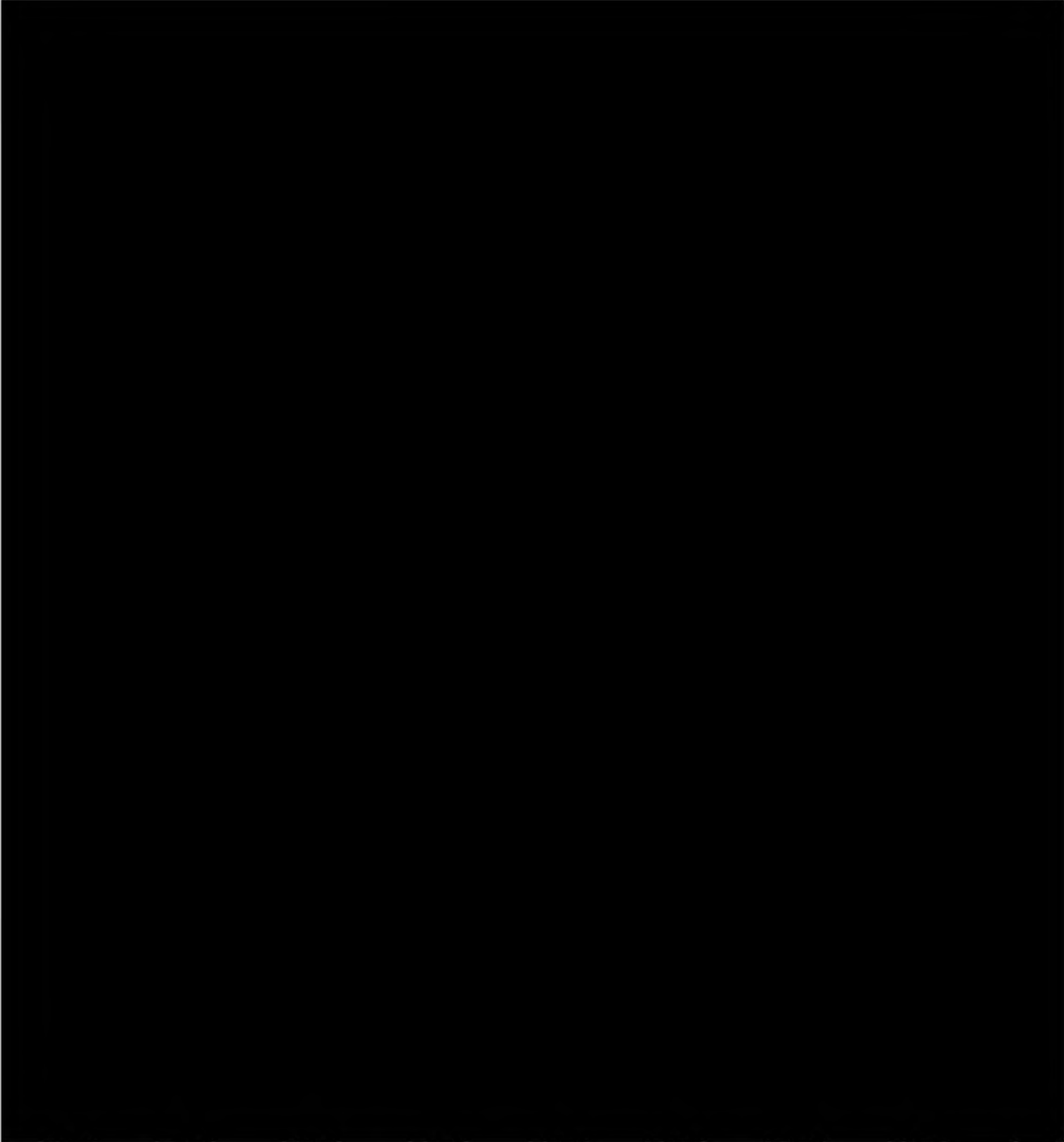
For information only, the expected round trip delay are indicated into the table below :

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DETAILLED CONFIGURATION

Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT

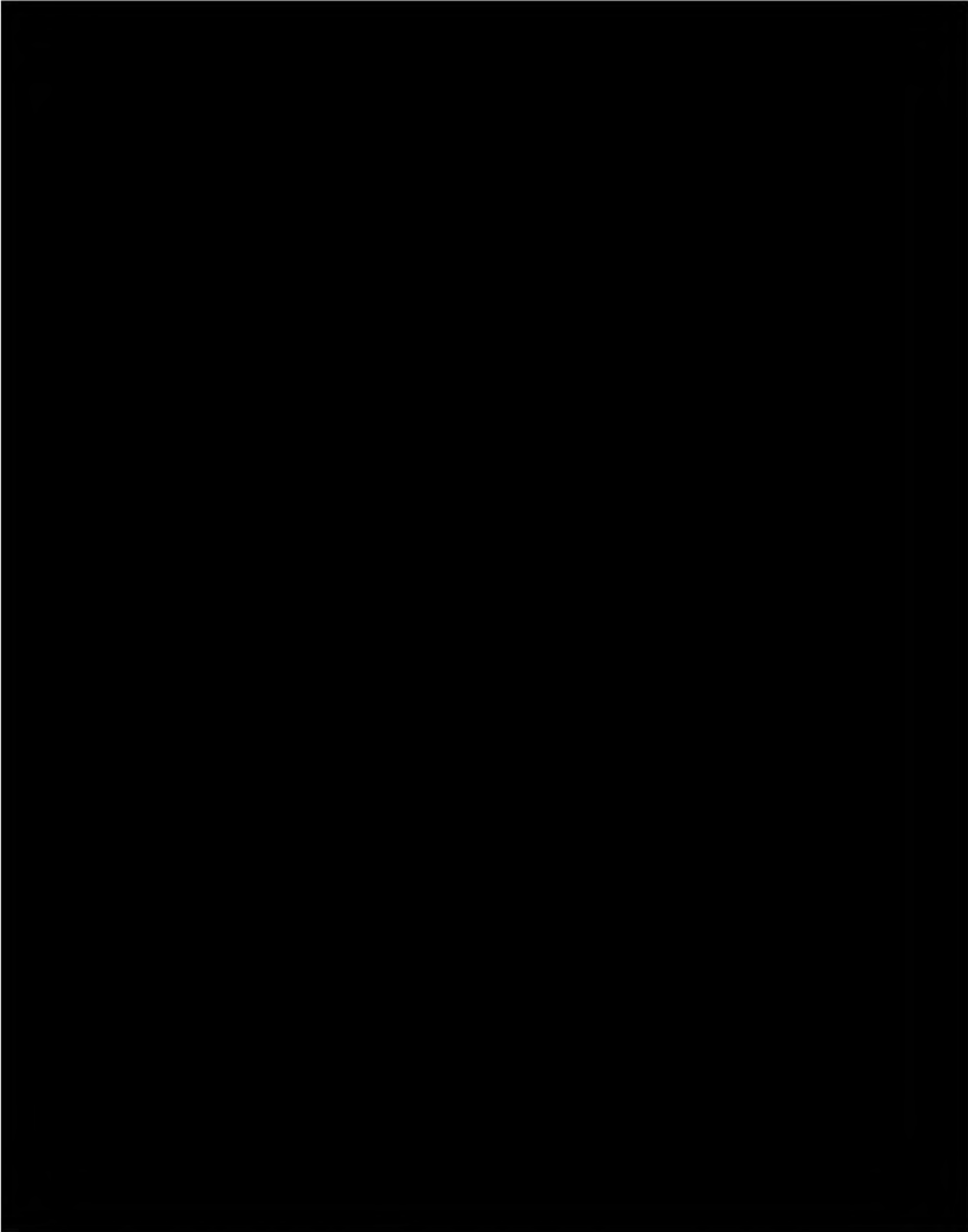| Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT

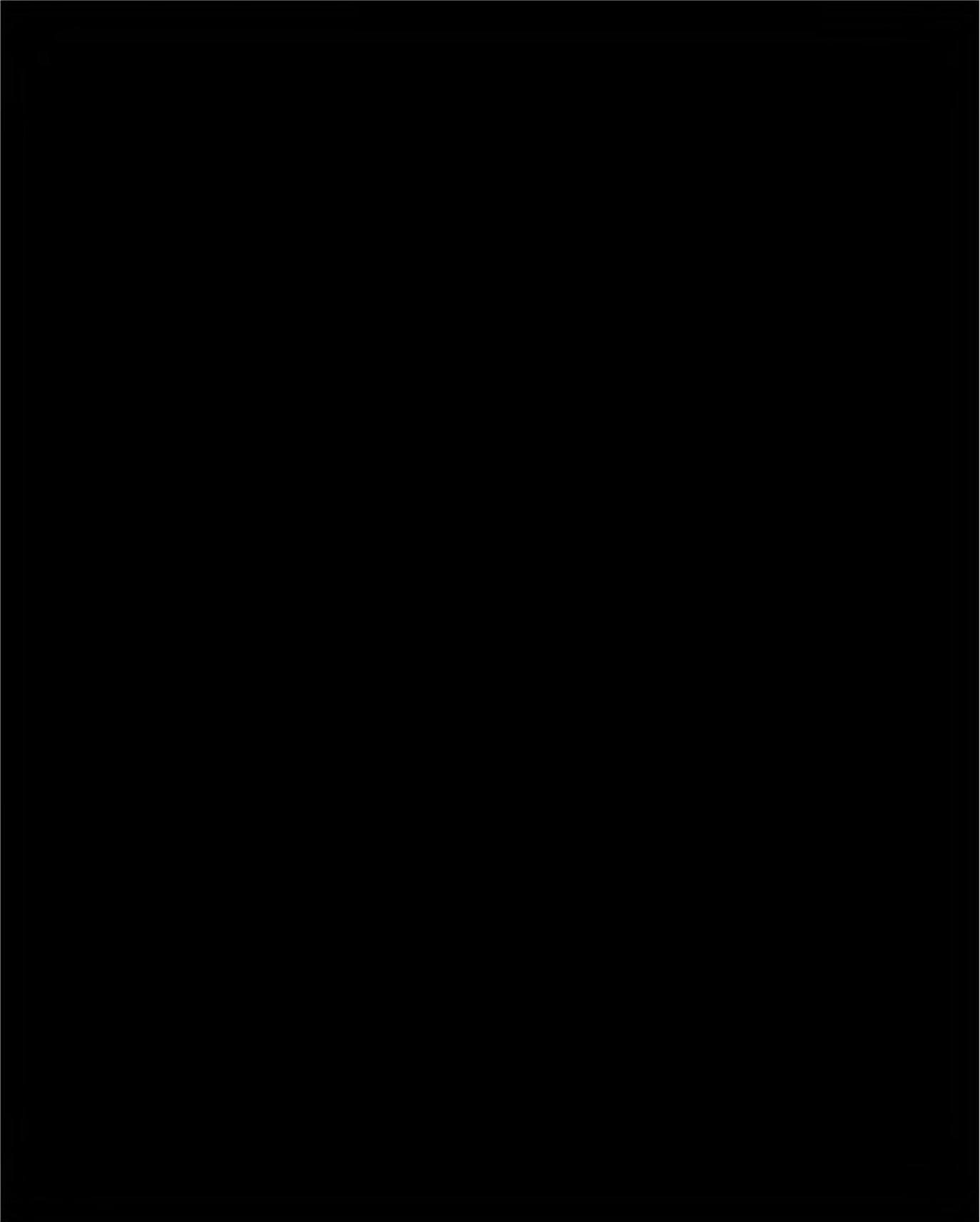| Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT

Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT

VLAN SEPARATION

- One single LAN interface
- VLAN tag 802.1Q for traffic seggregation, 1 x VLAN per VRF

Access link

Colt's CPE router
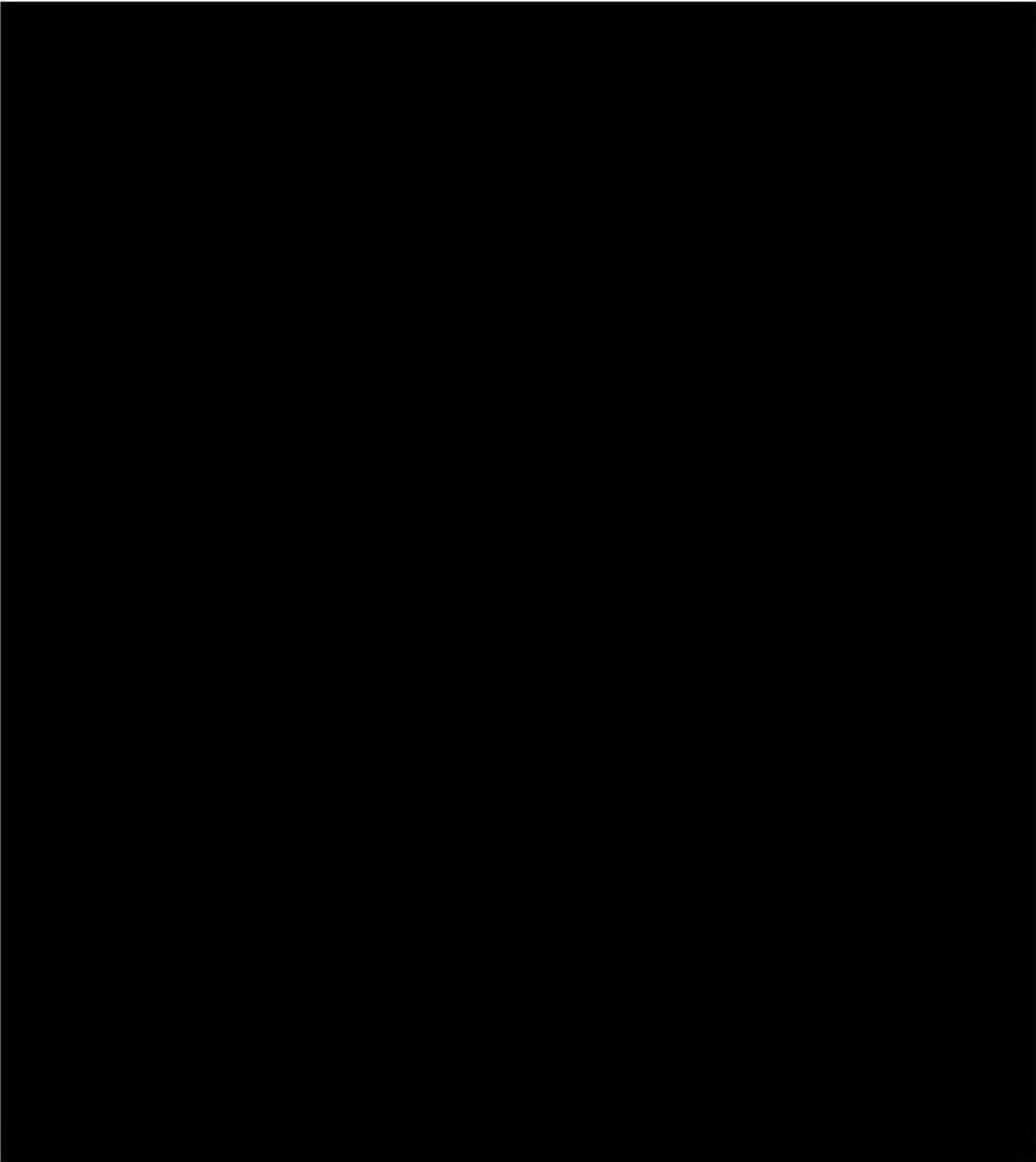
Lan interface

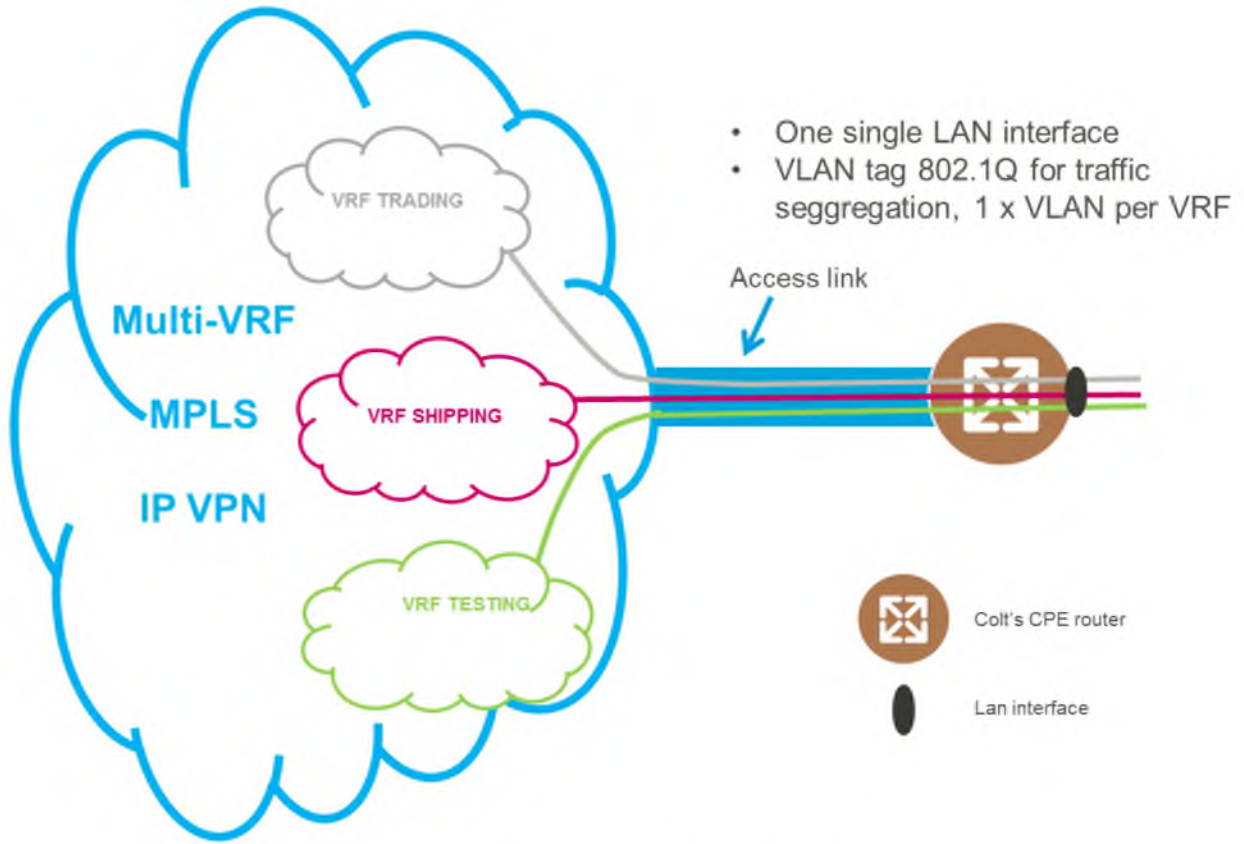**VLAN separation for XBID**

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3 Overview of Colt IP VPN Plus.

 Colt IP VPN Plus is an IP MPLS -based virtual private network (VPN) service that provides customers with the security expected of a private network, while at the same time offering significant benefits of a shared network in terms of cost and optimal connectivity.

Any-to-any connectivity of sites, regardless of their sizes, into a customer's network can be achieved easily, efficiently and securely, whether these sites are located within a single country or at diverse locations around the world.

Colt's ability to provide end-to-end managed networks ensures that we can offer customers a high quality, cost-effective solution backed by comprehensive service level agreements (SLAs) and award-winning customer service.

IP VPN Plus supports the greatest combination of service features while presenting a standard Ethernet interface on the local area network (LAN) port of the Colt managed CPE.

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For XBID project a physical CPE router on each customer site.
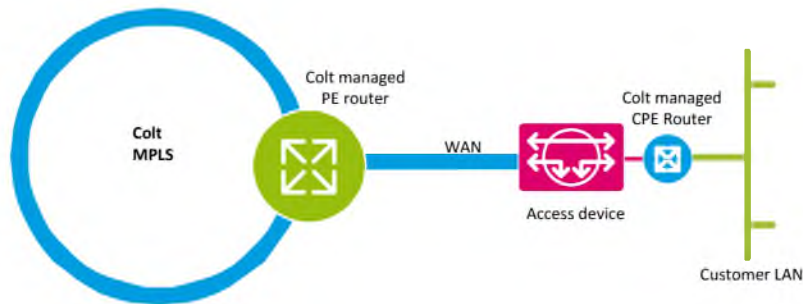
IP VPN Plus with Physical CPE

4 Colt's network coverage

Our secure and reliable network provides unrivalled reach across 19 countries with fibre-based metropolitan area networks (MANs) in 34 major cities. More than 17,000 buildings are directly connected to this network.
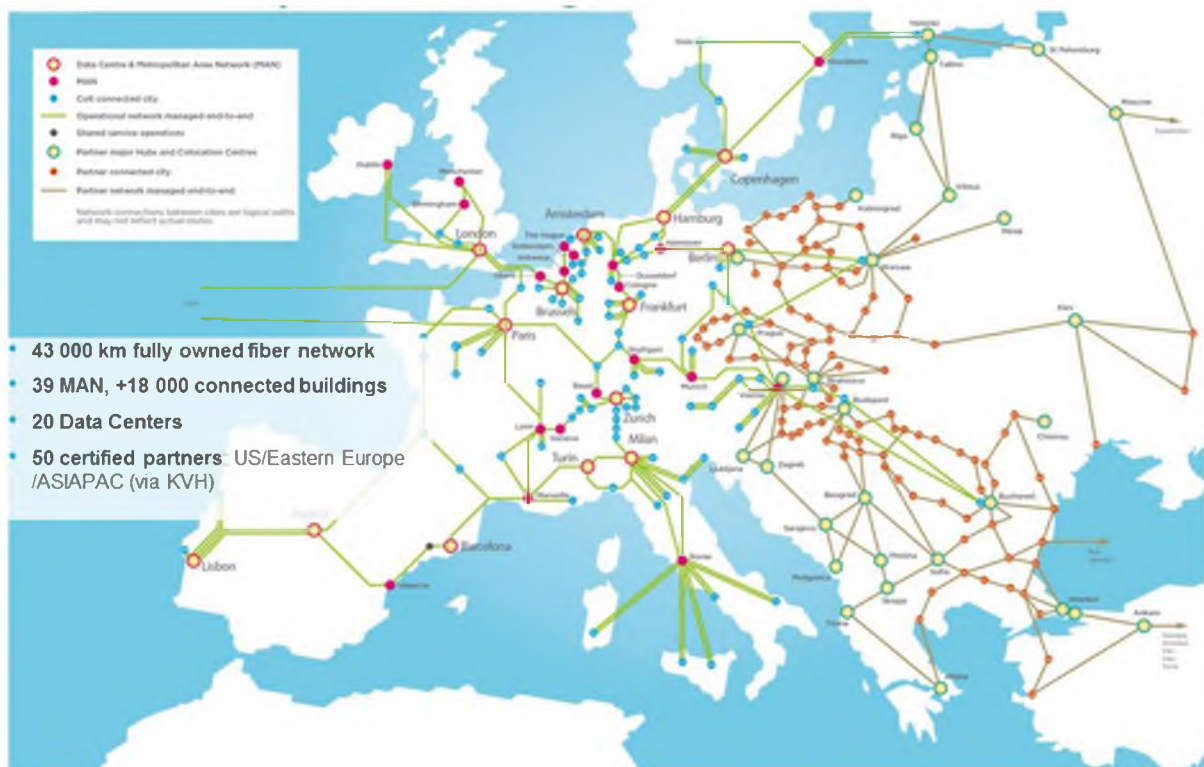
- 43 000 km fully owned fiber network
- 39 MAN, +18 000 connected buildings
- 20 Data Centers
- 50 certified partners US/Eastern Europe /ASIAPAC (via KVH)

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Colt network map

5 Network access

Colt has a comprehensive range of options for connecting customer sites to the Colt IP VPN backbone. Whichever access method type is used, the customer's solution will be created and managed by Colt under a single end-to-end SLA.

For XBID two types of network access will be proposed

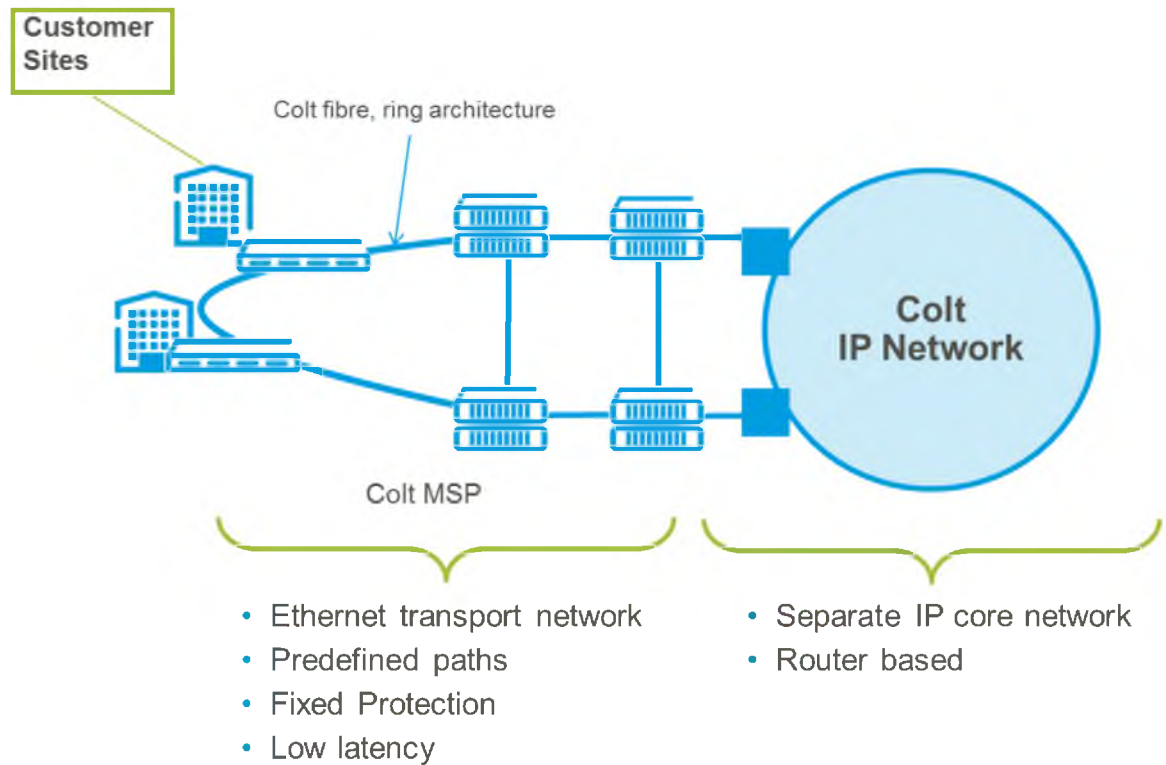## 5.1 Colt Fibre

Colt's MANs deliver high capacity, high speed bandwidth services to Europe's major business centres, which are interconnected via a European fibre-optic network delivering high quality reliable services door to door.

Each access to a customer's site uses ring architecture and diversely routed fibres where possible. Multi Service Platform (MSP) provides natively the capability to switch between the main fiber path and the protection fiber path. This is known as automatic protection switching. Access connectivity can be restored within 50ms in case of failure without impact for the IP VPN Plus service.

Within the core, each node is parented to at least two other nodes using Colt's own backbone. These two nodes are protected using the same method as in the access network to ensure high resiliency. The core network typically runs at availability levels of 99.999%.

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- Ethernet transport network
- Predefined paths
- Fixed Protection
- Low latency

- Separate IP core network
- Router based

Transport network architecture over Colt fibre.

5.2   Partner Ethernet tails

OLO (Other Licensed Operator) Ethernet circuits can be used to extend Colt's network to customer sites. Partner services are technically validated for compliance with key Ethernet technology standards and Colt's own product specification.

6   Bandwidth options

The IP VPN service is able to support different bandwidths as described in the following table for Colt Fibre access.

IP bandwidths available

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IP bandwidths available

| |
| --- |
| 64kbps – 2Mbps |
| 2Mbps – 20Mbps with increments of 1Mbps |
| 20Mbps – 50Mbps with increments of 5Mbps |
| 50Mbps – 150Mbps with increments of 10Mbps |
| 200Mbps – 1Gbps with increments of 100Mbps |
| Above 1Gbps available on request |

IP VPN bandwidth options

7 IP layer and routing protocols

The IP VPN service delivers and accepts both IP version 4 and version 6 packets. It routes packets between customer sites based on the destination IP address either by static routes or by routing protocols.

Dynamic routing can be present at three different places in the Colt IP VPN network:

- Between Colt managed layer 3 CPE and customer LAN

- Between physical edge (PE) router and Colt managed layer 3 CPE

- In the Colt managed VPN core (PE to PE)
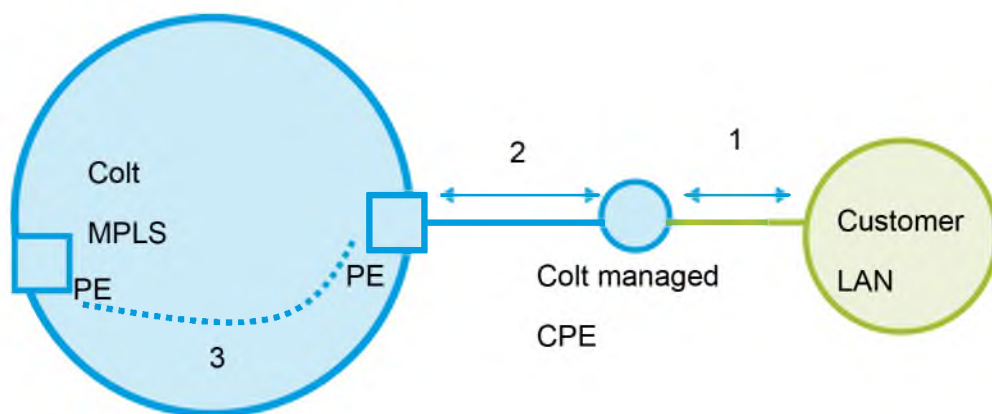
Dynamic routing

Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT

7.1 Dynamic routing between Colt managed layer 3 CPE and customer LAN

Dynamic routing is exchanged between the Colt managed layer 3 device and the customer's own management equipment so that when the customer changes something in the LAN (for example, adding new segments), this is then propagated automatically. This feature is available with IP VPN Plus. The following table describes the dynamic routing between Colt managed CPE and customer LAN.

Table: Dynamic routing options between Colt managed layer 3 CPE and customer LAN

	IPVPN Plus
BGP	Yes
RIP	Case-by-case
OSPF	Yes
EIGRP	Yes
Static routing	Yes

7.2 IP addressing

In order to manage the customer-located equipment and provide WAN connectivity across the network, Colt uses the IP addresses described in the following table. Customers cannot use any of these addresses on their own network.

Table : Excluded LAN IP addresses

Excluded LAN IP Addresses
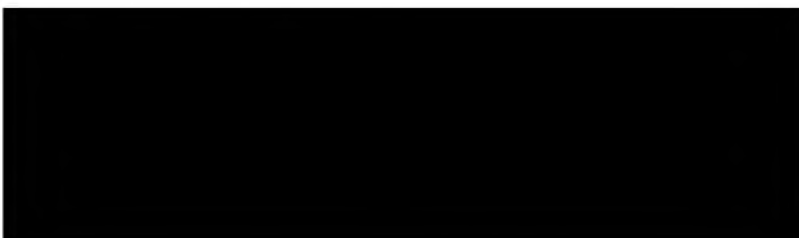
In addition, Colt uses the following two ranges to assign addresses for point-to-point WAN
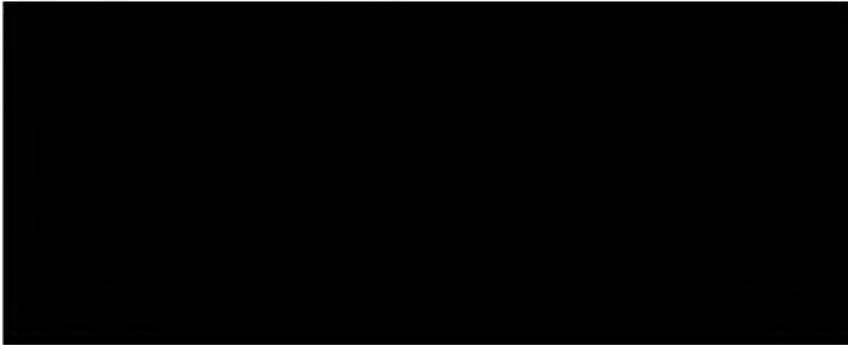
Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT

links. Customers may use only one of these ranges on their own network and Colt will use the other range for WAN links. Customers cannot use addresses from both ranges.

The following table describes IP addresses for WAN links for IP VPN Plus.

Table: IP addresses for WAN links for IP VPN Plus

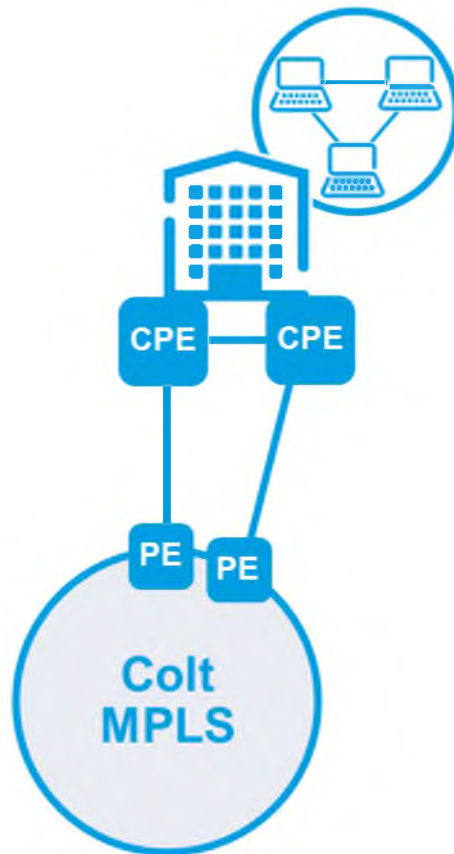**IP addresses for WAN links for IP VPN Plus**

Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT

8   Enhanced Resilience

Colt offers a number of options to help customers increase the resilience of their IP VPN Plus service. For XBID project Colt will offer dual access – primary and backup to connect the site of the various members.

In the dual access configuration described in the following figure, two CPE routers and two separate circuits are provisioned at the customer site (or two separate physical sites). And the two circuits will be attached to two distinct PE routers of Colt IP backbone.

This provides two traffic paths – a primary and a secondary route – into diverse routers on the Colt network. In the event that the primary circuit fails, traffic will be sent via the secondary route.

Dual Access architecture

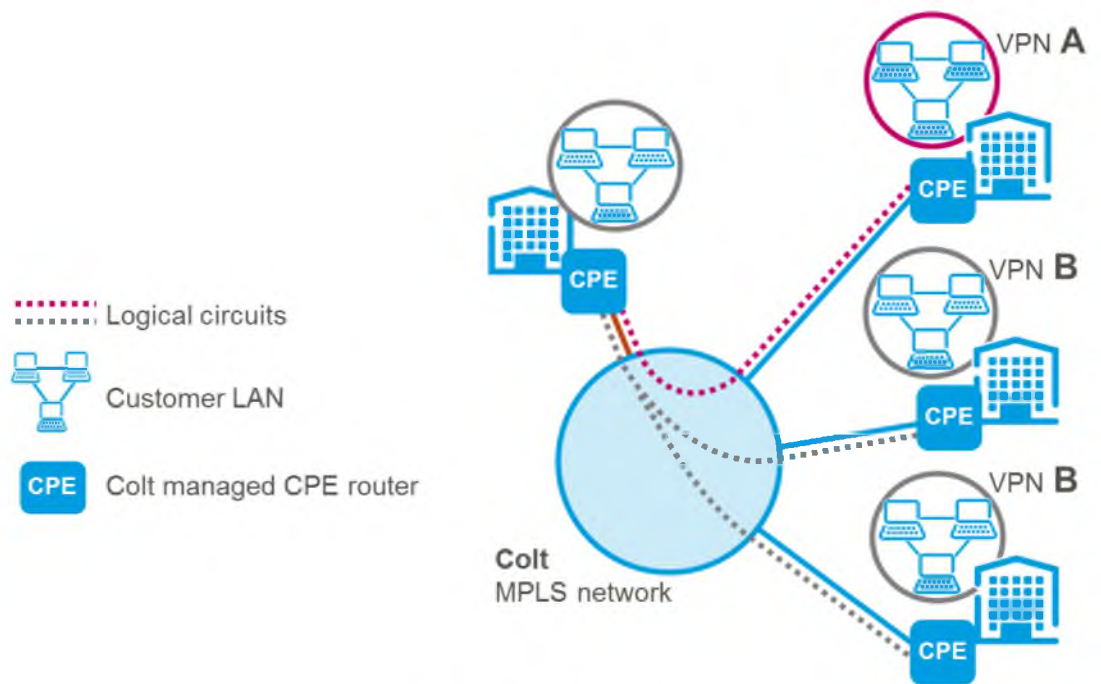| Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT

BGP routing is used between the different sites to ensure network resiliency is effective. At the customer site, Virtual Router Redundancy Protocol (VRRP) or/and dynamic routing (depending on LAN routing requirement) is used as a failover mechanism between the two Colt managed CPEs. The two CPEs act as primary and secondary routers.

9 Multi VPN

Multi VPN enables customers to manage multiple extranets or internal sub VPNs over a single Colt IP VPN Plus network while ensuring that each extranet is entirely separate and unable to communicate with any other.

On the LAN side, multiple sub VPNs can be delivered on either separate physical Ethernet interfaces (there is a maximum of two per site) or up to 10 logical VLANs (802.1q). On the WAN interface, multiple logical circuits are presented on a single physical WAN access circuit.

Bandwidth is defined on a per **logical** circuit basis (that is, per sub VPN), so it is not possible for one sub VPN to burst into the bandwidth on another on the shared physical access circuit. The sum of the sub VPNs on one access circuit must be smaller than the service bandwidth of that site. The maximum number of sub VPNs is 5 per site.

Multi-VPN concept.

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10 SNMP read-only access

SNMP read-only access version 2 and version 3 are available for IP VPN Plus . SNMP read-only access to the Colt managed CPE provides access to parts of the Management Information Base (MIB)-II system: MIB-II interfaces and Environmental Monitoring MIBs.
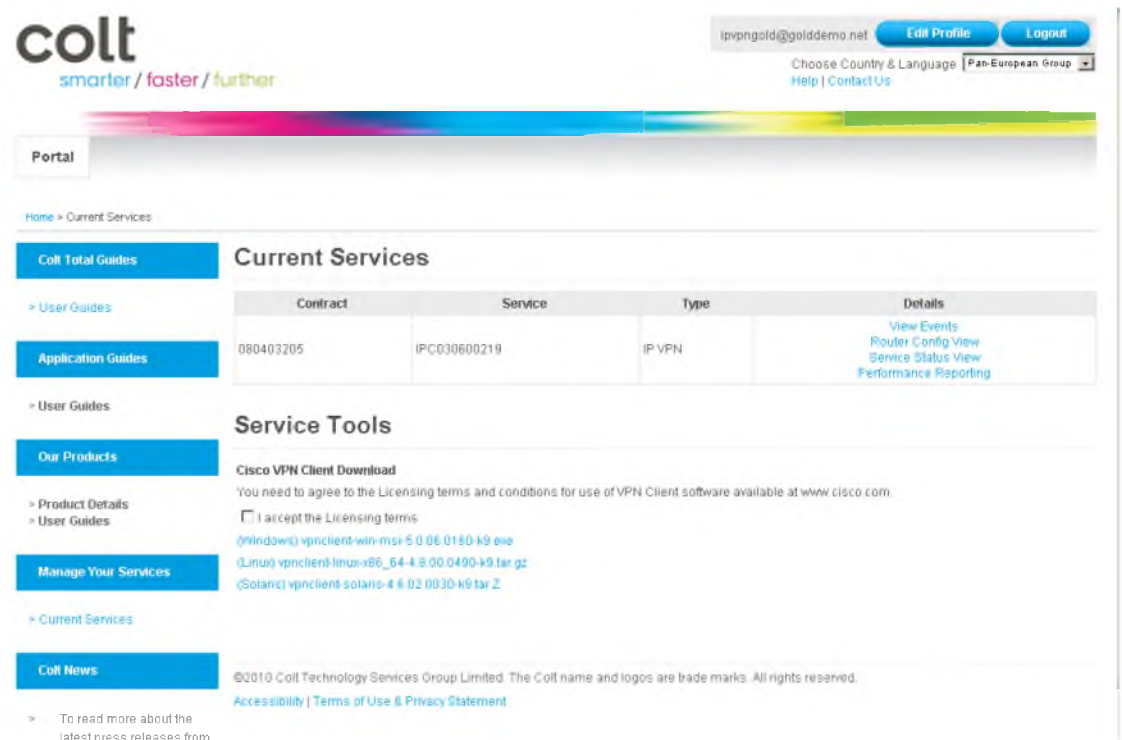
11 Performance Reporting

Online service performance and service management reports are available as part of the IP VPN service. Customers can access these reports at any time for up-to-the-minute indicative information on how their network is performing.

Customers can view performance reports of their IP VPN network online by selecting Colt's Silver or Gold packages.

One portal will be made available for all PXs who can see all details.

The following figure shows the Colt Portal.

Performance Reporting Portal

Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT

11.1 Silver Package

Customers can see throughput statistics on the physical interface in the network as network performance information including availability, packet loss and round trip delay.

The following figure shows a report available with the Silver package.
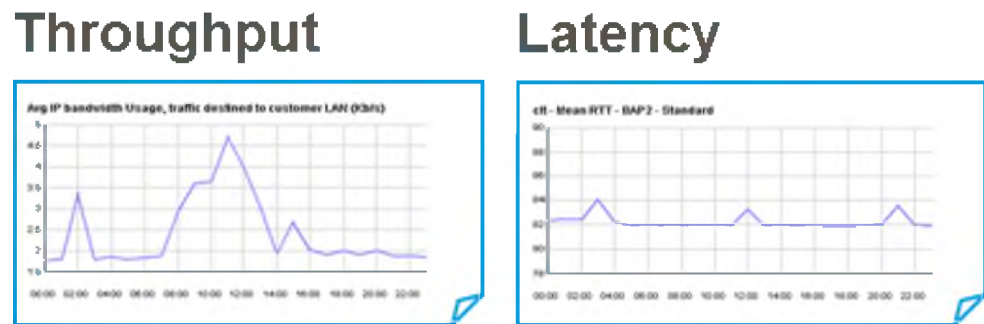
Throughput and Latency (Round Trip Time) report examples.

11.2   Gold Package

As well as the reports available with the Silver package, customers can also see reports relating to router configuration, gain access to the logs for the devices installed by Colt and view graphical views of the real-time service status shown as red, amber or green.

Gold reporting is only available with IP VPN Plus.
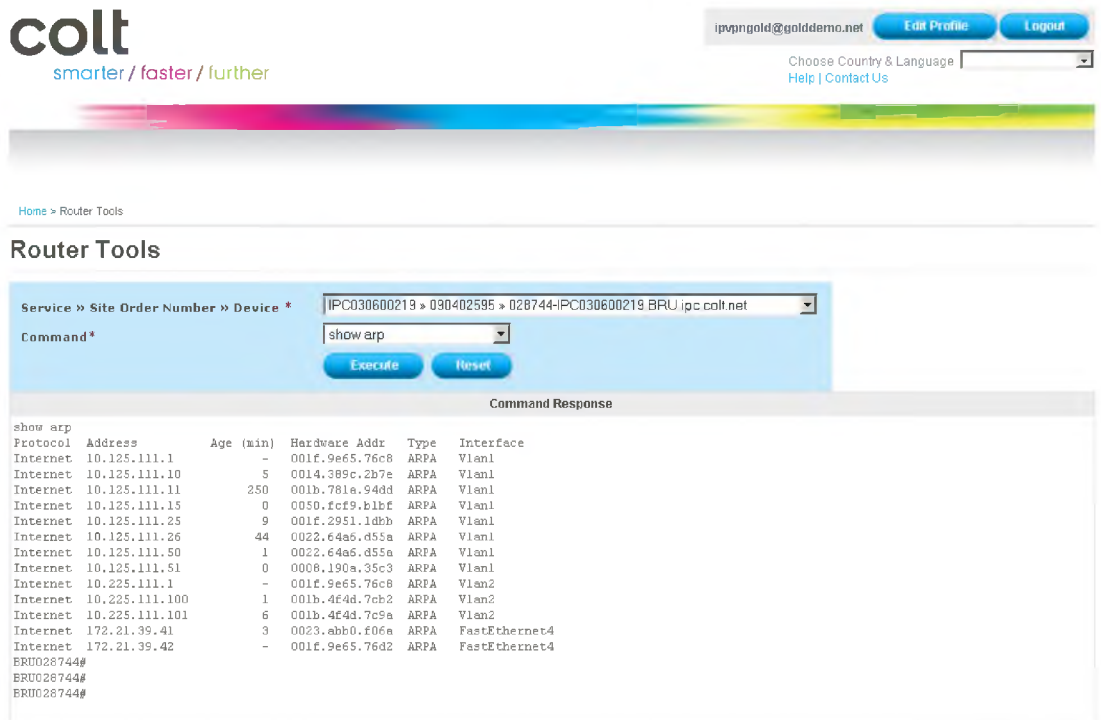
11.2.1 Router Configuration View

The Router Configuration View provides customers with the following:

- Device identification and IP address

- Configuration of interfaces

- Ping, traceroute, routes

- BGP, CEF, RIP, OSPF, DHCP, policy maps

- Access lists

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- Clear functions for counters, access lists and BGP configurations

  The following figure shows the Router Configuration View.
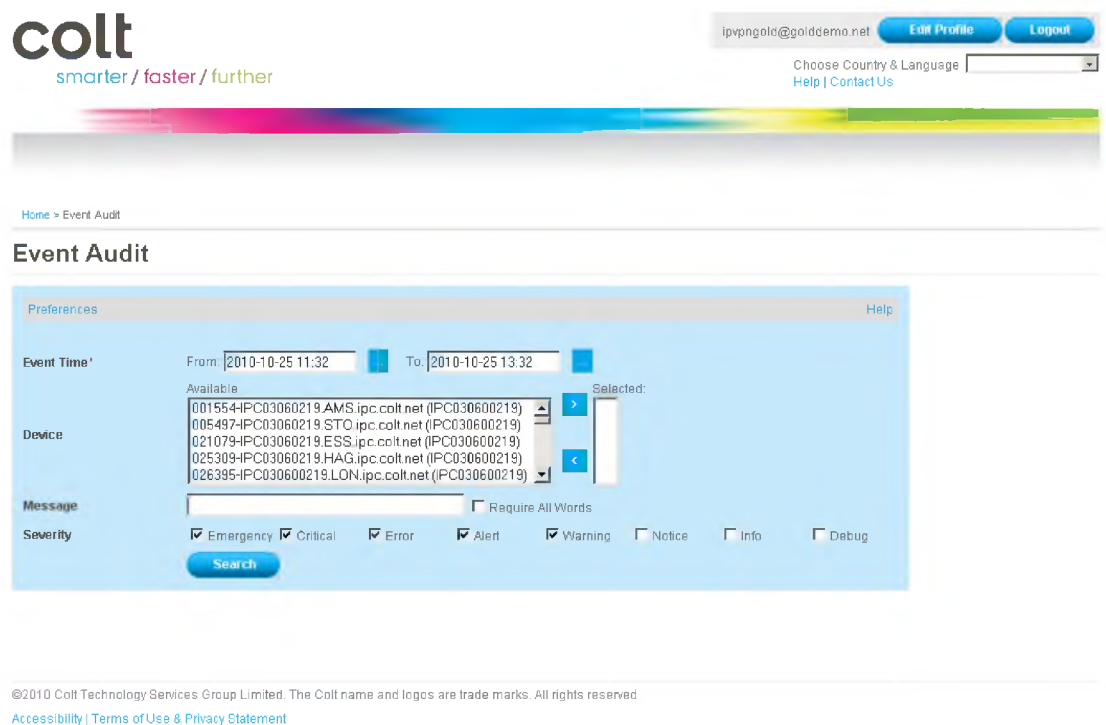

Router Configuration View

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11.2.2 Event Log Viewer

The Event Log Viewer provides customers with access to the logs for the devices installed by Colt on the customer premises. This capability provides customers with:

- Device identification and IP address

- Ability to search for a given device or series of devices over the last 12 hours

- Ability to file based on severity

Note that one month of log data is kept available in the system and can be consulted. The following figure shows the Event Log Viewer.

Event Log Viewer

11.2.3 Service Status View

The Service Status View provides customers with graphical views of the real-time
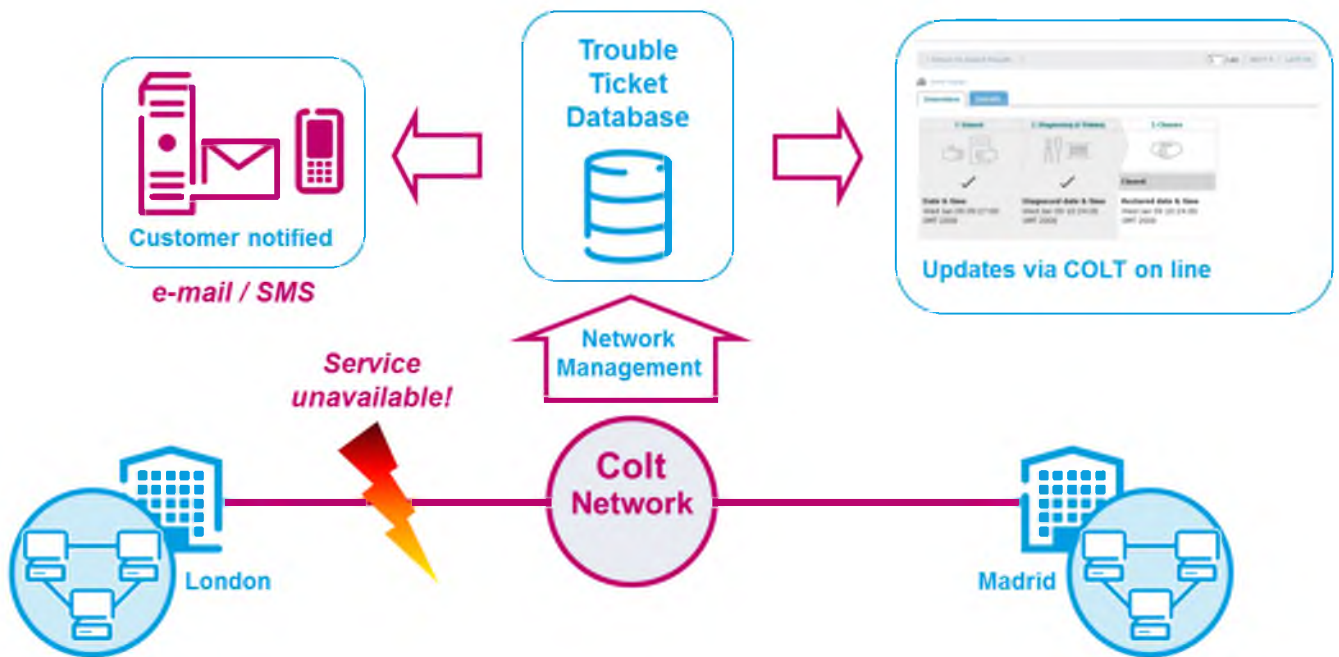
Initial of APX	Initial of APX UK	Initial of Belpex	Initial of EPEX Spot	Initial of Nord Pool	Initial of OMIE	Initial of GME	Initial of COLT

service status shown as red (critical), amber (minor) or green (no issue). The status is shown in real-time on the secured portal.

12 Service monitoring

The Colt IP VPN backbone network is proactively monitored and maintained by Colt. For IPVPN Plus, the IP VPN service is proactively monitored and maintained by Colt on an end-to-end basis, including the access circuit and the CPE router. This means that Colt proactively instigates remedial action when a fault is detected by the Colt monitoring.

Proactive notification is an optional service. In case this service is taken, customers are proactively informed of Colt opening a ticket. In case this service is not taken, Colt proactively investigates remedial action when a fault is detected but customers are not proactively informed of this action.

- Raise Trouble Ticket & resolve fault without customer call
- Fault Notification via customer e-mail and SMS
- Customer Service Assurance details captured at ordering stage

Pro-active Monitoring and Notification

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Colt – Développement Durable

Notre environnement

Chez Colt, nous croyons à la réduction des effets négatifs de notre activité et au développement des aspects positifs que la contribution des employés et des services peut offrir pour un futur durable. Nous sommes engagés dans des projets bénéfiques à la fois pour Colt et pour l'environnement et les communautés au sein desquelles nous intervenons.

Nous travaillons dans le respect de toutes les lois applicables dans les pays dans lesquels nous avons une activité et nous surveillons continuellement notre conformité avec la Directive Environnementale de l'Union Européenne.

Participez à la réduction de l'empreinte carbone | Réfléchissez avant d'imprimer

Merci de recycler ces dossiers une fois votre analyse de notre offre complétée.

Colt is Europe's information delivery platform, enabling its customers to share, process and store their vital business information Colt provides major organisations, midsize businesses and wholesale customers with a powerful resource that combines network and IT infrastructure with expertise in IT managed services, networking and communication solutions. Colt operates a 13-country, 37,000km network that includes metropolitan area networks in 34 major European cities with direct fibre connections into 20,000 buildings and 20 Colt data centres.

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