MPLS & Ethernet Infrastructure & Services: BT’s Perspective

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Describe the diverse range of services that BT supports using Ethernet and MPLS

- **“Standard Services”**
  - MPLS VPN
  - Ethernet E-LINE
  - Ethernet E-LAN
  - Wholesale Broadband

- **Other Services**
  - Mobile (Cellular) Backhaul
    - E1, ATM & Ethernet PWE3s
  - High performance Financial Markets Services
  - Content Services
    - Broadcast Video
    - CDN, IP (Linear) TV & Canvas

- **Converging onto a single Ethernet/MPLS platform**
  - How 21CN underpins Ethernet, Mobile Backhaul, Broadband & Content services
MPLS VPN

Scale
- 172 Countries
  - >230000 customer ports
    - >100000 outside UK
  - >200 PoPs
    - >180 outside UK
  - Still seeing significant growth
- Market Share (IDC)
  - UK: 40%
  - Global: 16%
- Customers include
  - Large financial institutes
    - Some of the world’s largest financial market data vendors
    - Multiple banks
  - Public Sector / Government
  - Transport Industry
  - Retail & Food Industries
  - Pharmaceutical Industry

Architecture
- Hierarchy
  - Tier 1: Aggregation & Routing
  - Tier 2: Aggregation & Customer access
  - Regional Route Reflectors
- Resilience
  - Intra & Inter PoP
- Dual Vendor Core
  - Dual Tier 1 Core
  - Physical separation
- 6 CoS
- Multicast enabled
- Future evolution
  - Even more Ethernet access
  - Further NNIs to complement traditional PoP expansion
    - Expand in-country coverage
  - IPv6
E-LINE & Mobile (Cellular) Backhaul

- Etherflow UK
  - P2P Service
    - VLAN access
    - Ethernet PWE3 backhaul/core
  - >700 PoPs
  - >100 PoPs of EEA
    - Access & Aggregation layer
  - ~600 PoPs of EES
    - Access layer
  - Port speeds from 10 Mbps to 1 Gig
    - Sub rates from 1 Mbps

- Mobile (Cellular) Backhaul
  - Built on top of Etherflow
  - E1 & ATM PWE3s
    - From base station to mobile switch site
  - 4 out 5 UK Mobile Operators
  - Still in deployment
    - Contracts total ~20k base stations
  - Future direction:
    - Near term: Ethernet presentation & synchronisation
    - Long term: supporting LTE with IP layer & any to any capabilities
Managed VPLS service covering Spain
- First launched in 2004
- Mainly E-LAN Any to Any connectivity
  - Some E-LINE (P2P) and Hub & Spoke
  - Access port speeds from 10 Mbps up to 1 Gbps
    - Mixture of technologies including EFM
  - Access sub-rates from 1 Mbps to 990 Mbps
  - 6 CoS
- HVPLS implementation.
  - Core of 4 nodes in 4 PoPs
    - Madrid and Barcelona
  - 10 VPLS regions covering different geographical areas.
  - 46 PoPs covering all 51 provinces.
    - Including the Canary and Balearic Islands.
- Gateways to
  - BT MPLS VPN
  - Internet
  - Voice Softswitches

Standalone managed VPLS service covering London
- E-LAN Any to Any connectivity
  - Access port speeds from 10 Mbps up to 1 Gbps
  - Access sub-rates from 2 Mbps to 900 Mbps
  - 2 CoS
  - 6 Access PoPs
  - 2 Core PoPs
- VPLS used for some internal management (DCN) on 21CN
- Planning VPLS for supporting Wholesale IPTV services
Wholesale Broadband

- **20CN IP Stream Connect**
  - Up to 8 Mbps ADSL2
  - Available to >99% of UK population
    - >5500 Exchanges (Central Offices)
  - ATM backhaul
- **21CN Wholesale Broadband Connect (wBC)**
  - Up to 24 Mbps ADSL2+
  - Available to:
    - 45% of UK population (March 2009)
    - 55% of UK population (March 2010)
  - Ethernet (VLAN & PWE3) backhaul
- **21CN Next Generation Access / “Super Fast Broadband”**
  - Extension to wBC
  - Up to 100 Mbps FTTx
    - Up to 40 Mbps VDSL
    - Up to 100 Mbps GPON
  - In trials
    - Pledged £1.5 Billion to deliver SFBB to 40% of population by 2012
Algorithmic trading and direct market access are the biggest disruptors in modern-day markets

Gone from virtually 0% to 35% of institutional order flow in 5 years.

- Capital markets participants require:
  - Fast, direct connectivity to execution venues in major financial markets
  - Extremely low, deterministic latency
    - “Yesterday’s ultra-low latency is merely today’s low-latency.” Tabb Group
  - Extremely High SLAs

- ULTRA offers:
  - Services in New York, Chicago, London
  - Up to 10 Gbps Access
  - Deterministic latency & RTD <1 ms
  - 100% Uptime Guarantee
  - Fully resilient, non-blocking architecture
    - Single Telco hop
  - Multicast replication
  - Direct Market Access Speedometer
  - Network visibility tools
  - Bandwidth management

“If a broker’s electronic trading platform is 5 milliseconds behind the competition, it could lose at least 1% of its flow; that’s $4 million in revenues per millisecond” Tabb Group

“When talking about low latency connectivity to execution venues, no one else compares [to BT].” Bryce Byers – President & CEO, Neovest


As if the exchange is connected in their basement
Media & Broadcast Global MPLS Media Network

- Broadcast applications
  - Dynamic ‘contribution’
  - Permanent contribution & distribution
  - High priority data
    - Non RT programmes, VoIP, CES
  - Lower priority data

- Broadcast requirements
  - Low latency, Low Jitter
  - Zero packet loss
  - Flexible control path
  - Bandwidth on demand

- 75 core nodes & 200 transmitter nodes
- Dual diverse signal routing over network
- Over 150 video end points
- Total of over 800 MVPN destinations
- 2000 Multicast destinations @ 30 Mbps each
Wholesale Content Services

- Wholesale Content Connect (wCC)
- Establishing broadband as a content delivery platform
  - Reduce impact of OTT content for ISPs
    - Insert ISPs into the commercial value chain for distribution of OTT content over broadband
    - Enable ISPs/CSPs to launch Quality Assured content services
      - Harnessing QoS & BB to deliver a fantastic content experience for End Users
  - Co-locating Content Caches with BB IP Service Edge
    - QoS enabled CDN & BB
    - Distribution via MPLS VPN
  - Wholesale IPTV services
    - VPLS or MPLS VPN
  - Future: Move BB IP Service Edge closer to End Users
Canvas (http://www.projectcanvas.info)

A ‘front door’ to Linear & On Demand content & Web Applications via your TV.

Canvas Offer

- Free TV & VoD
  - Over 40 Freeview channels
  - HD Freeview (Optional)
  - Catch up TV
  - Archive TV
- Paid TV
  - Premium VoD
- PVR (Optional)
- Selected online sites such as Flickr & YouTube (not confirmed)

Key Principles

- Hybrid Digital Terrestrial and IP Content Delivery
- Common Canvas UI that fuses Linear and On Demand content.
- Discover and access individual Content Providers’ portals.
- Search across multiple Content Providers for a particular item of content (On Demand, Broadcast & locally stored)
Defining and promoting a standards based, open environment, for Internet connected TV.

| Canvas Venture | • Publishes common standard  
|                | • Markets venture  
|                | • Develops and operates top level UI |

| Content Providers | BT Vision  
|                 | • Publish VoD content to Canvas  
|                 | • Operate ‘Store’  
|                 | • Bill customer  
|                 | • Deliver Adverts |

| ISPs | BT (+Wholesale CDN)  
|      | • Deliver VoD services to customers  
|      | • Commercial agreement for Streamed content  
|      | • Retail to customers and provide CS |

| Devices | STB Manufacturers  
|         | • Develop and sell Canvas devices |
Convergence on 21CN

- Multiple Services
  - Ethernet
  - Circuit Emulation
  - Broadband
  - Content

Single Ethernet/MPLS infrastructure

- 2005-7
- 2008-9
- 2010+

- + ~4400 Tier 2 & 3 Access/Aggregation PoPs
- + ~1000 Tier 1 Aggregation PoPs (~600 with Ethernet PWE3)
- +86 Metro PoPs (including Ethernet PWE3)
- 20 Core PoPs (including Ethernet PWE3)
- ~1000 Tier 1 Aggregation PoPs
- ~4400 Tier 2 & 3 Access/Aggregation PoPs

ISP’s Network (e.g. BT Retail)

WWW (Internet)
QUESTIONS?