



# PCTY2011



Pulse Comes to You

**Optimising the World's Infrastructure**

# Infrastructure and Application Performance Architecture at BT



Phill Radley  
Chief Architect – Network Performance Reporting  
BT Innovate and Design

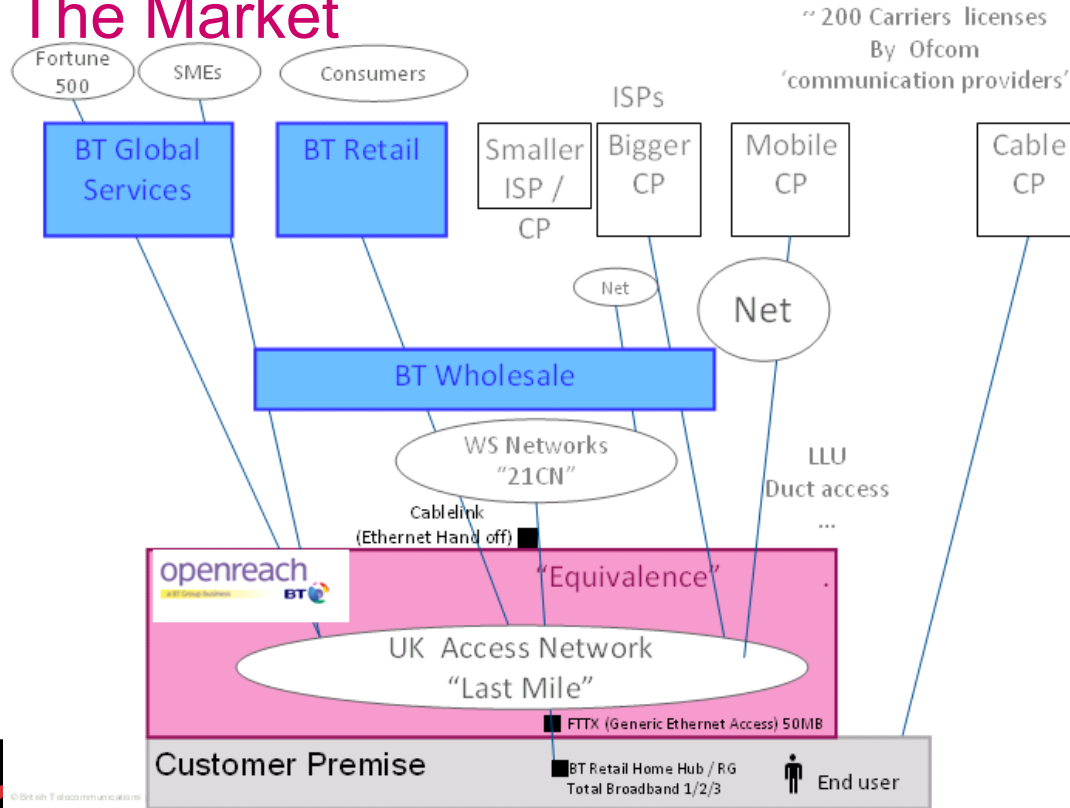




## Agenda

- BT (organisation & architecture)
- BT Infrastructure
- BT Applications and TNPM/Proviso
  - Overview of Deployments

# About BT – The Market

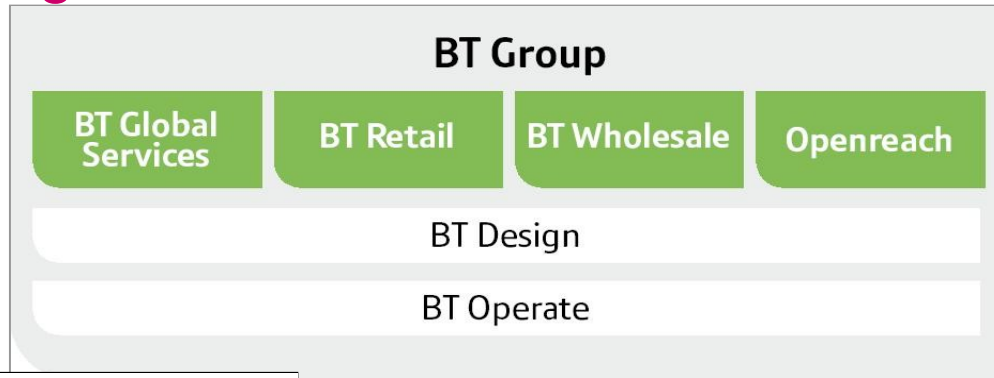


# About BT – BT Numbers (to 31/3/2010)

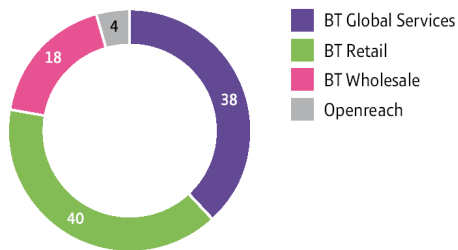


- Overview
  - Revenue~ £20.7Bn
  - Profit ~ £1BN (before tax)
  - Employees ~ 100,000
- UK Infrastructure
  - 25M Total Exchange lines in UK
    - 4.3M Unbundled Local Loop
    - 15.1M Broadband Enabled
      - ~ 1/3 BT Retail 2/3 Other ISPs
- Global Infrastructure
  - ~ 2500 P/PE routers ~240 PoPs 140K I/F 3K VRFs
  - + Metro-Ethernet, Hosted IPT... nodes

# About BT – Organisation

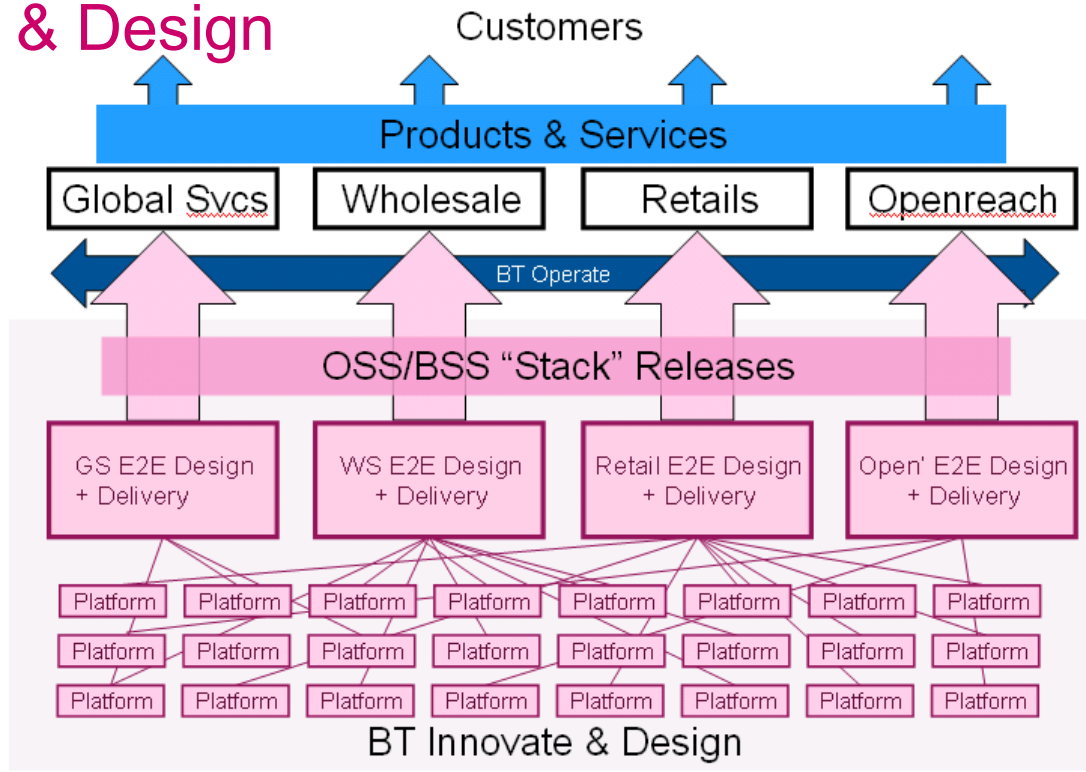


2008 external revenue by line of business (%)



- Lines of Business “ 6 **LoBs**”
- Market Facing Units “ 4 **MFUs**”

# BT Innovate & Design

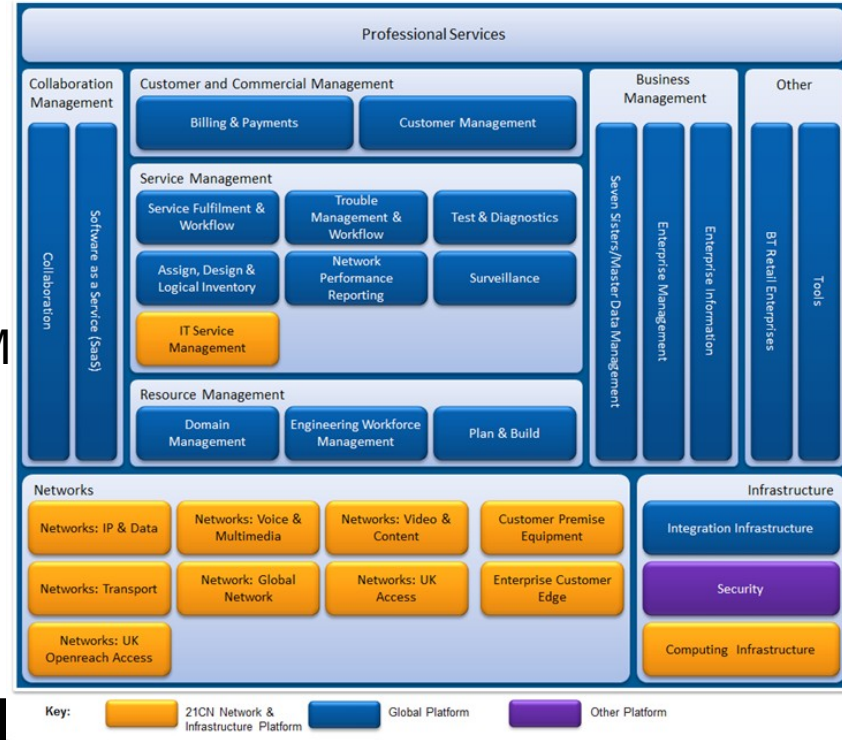


# BT Innovate & Design – Platform Architecture



## Platforms Contain

- All relevant systems
- All “experts”
- Communicate using SOA + EDM





# Physical Infrastructure

4 Million poles  
~ 25,000 p.a.  
120M KM of  
copper



200,000  
'person'-holes



80,000 cabinets  
as in 'FTTC'

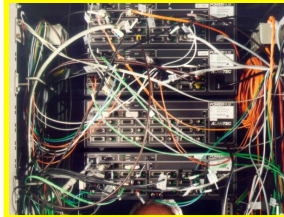


56,000 vehicles

Every day 25,000 engineers visit 11,000 homes and offices  
and climb the height of Everest up telegraph poles !

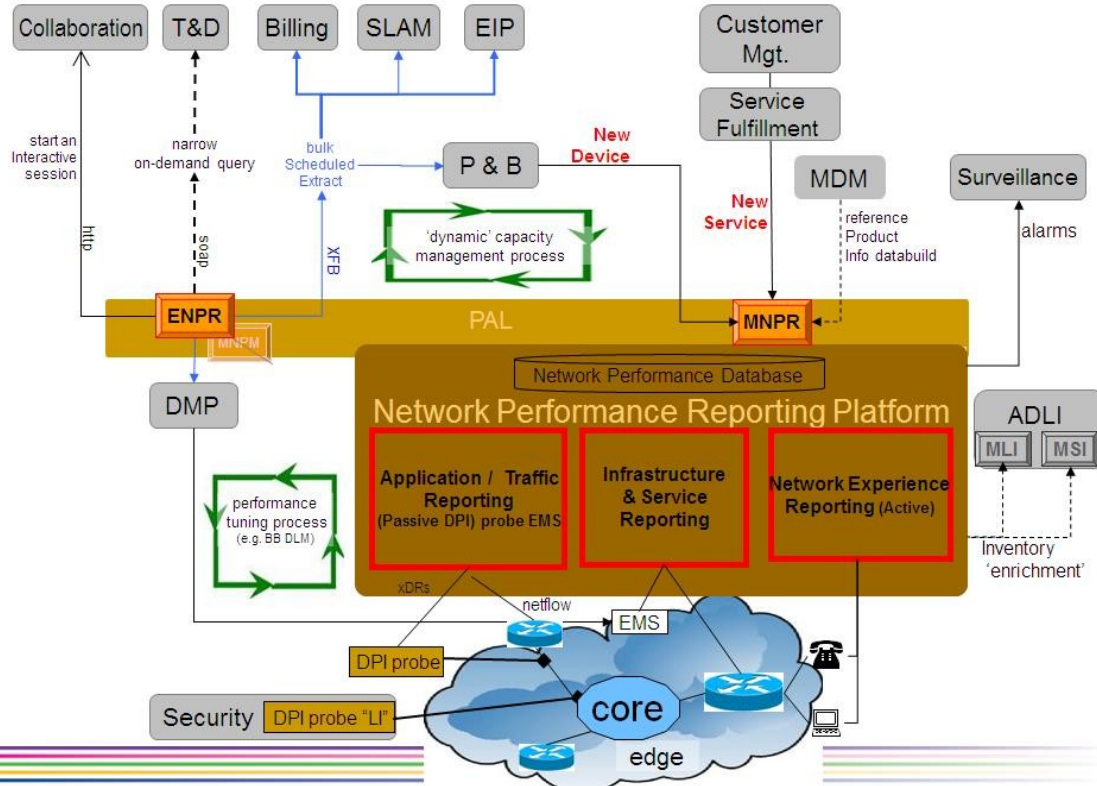
# Virtual Infrastructure

- Enterprise networks are complicated....
- Service Providers networks are more complicated..
  - Bigger facilities
  - Shared across customers “multi-tenant”
- Virtual Everything.....
  - VLANs, VPNs, Virtual Servers....
  - The virtual world changes faster
    - good for customers, challenge for architects..
    - A router that had 10 interfaces when it was commissioned can end up with 10,000 virtual interfaces after a DSL provisioning system has worked on it for a few months
- except the complexity which is real !





## Network Performance Reporting Reference Architecture (Logical)



# Architecture Implementation Strategy....

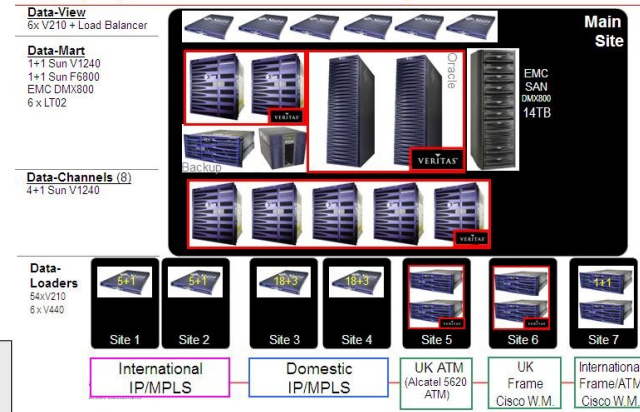
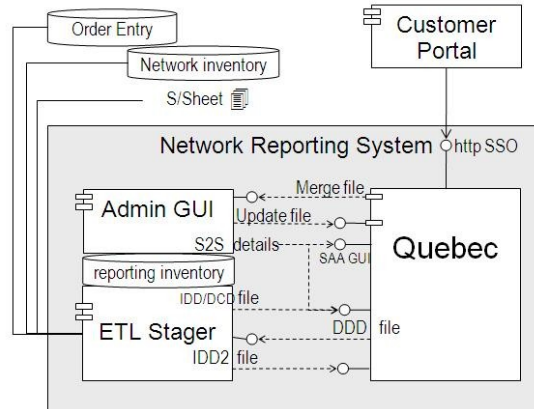


- NPR Platform owns ~ 100 PM systems which go back 15+ years these are a mix of in-house, open source and COTS
- Current BT Strategy for Network Infrastructure Reporting is to use to IBM Tivoli Netcool Performance Manager as the 'rule of one'
- Aging systems are migrated to TNPM as part of 'system rationalisation' roadmaps, sometimes a small legacy SNMP system can be hosted o a much larger Proviso, other times a large migration project is needed (eg to avoid maintenance or upgrade charges from another COTS vendor).
- New business needs (NGA/FTTC) are delivered using TNPnM

# #1. "Quebec" Application = GS MPLS, UK Frame/ATM

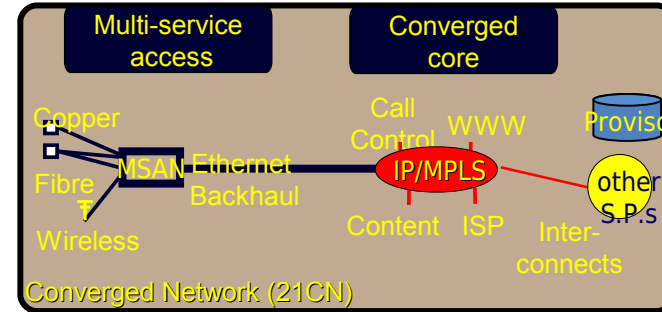
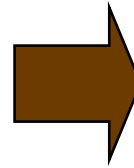
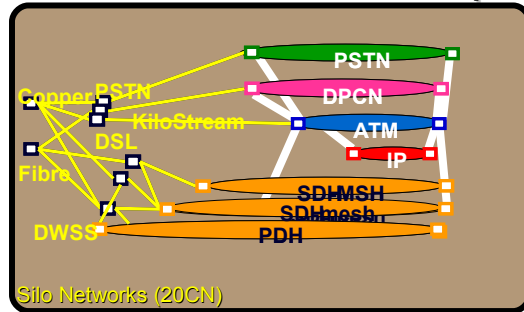


- Go-Live April 2004
- 'bolt-on' to legacy OSS stacks using an ETL to collate inventory from relevant systems
- Apx 1.4M resources
- 90 day RAW
- Inventory provides device and interface, filtered discovery used for COS (apx 0.5M cos ques)



## #2 “Net.Health 21” Application= WS 21<sup>st</sup> Century Network

20CN Separate networks for each service

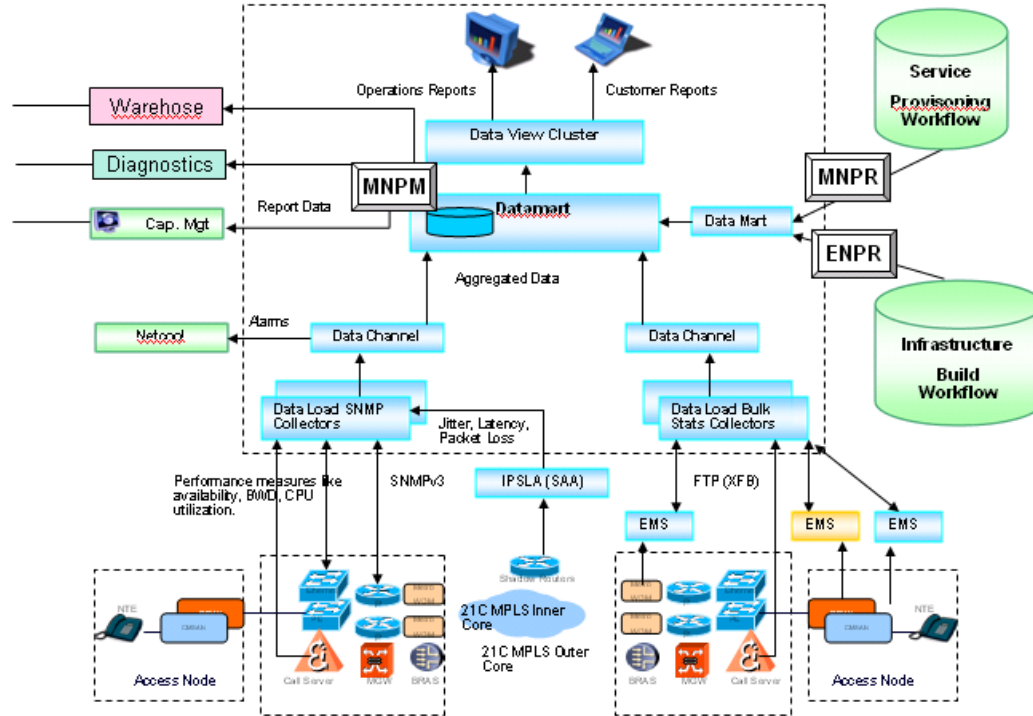


- “21st Century Network”: converged core with many applications overlaid
- - Voice (PSTN & VoIP)
- - Data (MPLS, DSL/Broadband)
- - Carrier Ethernet (esp. Mobile Backhaul)
- - VoD (Cisco CDN)
- - IPTV – Multicast IP (BT Vision / Canvas / Youview)



# #2 "Net.Health 21" Application= WS 21<sup>st</sup> Century Network

- Go Live 2006
- Multiple OSS feeds
- First use of SOA wrappers





# #2 "Net.Health 21" Application= WS 21<sup>st</sup> Century Network

**NetHealth21**  
SDN Performance Monitoring

Processor Occupancy View  
Resource Summary Report  
Date: 17 Sep 09  
Period: Daily

Name	SNE_ID	Unit	Processor Occupancy	Info
18728_ahelc1ub_ahelc1ub1	18728	BNPE	170809 12:30	0
18728_ahelc1ub_ahelc1ub2	18728	BNPE	170809 12:30	3
18728_ahelc1ub_ahelc1ub3	18728	BNPE	170809 12:30	9
18728_ahelc1ub_ahelc1ub4	18728	BNPE	170809 12:30	0
18728_ahelc1ub_ahelc1ub5	18728	BNPE	170809 12:30	0
18728_ahelc1ub_ahelc1ub6	18728	BNPE	170809 12:30	1
18728_ahelc1ub_ahelc1ub7	18728	BNPE	170809 12:30	1
18728_ahelc1ub_ahelc1ub8	18728	BNPE	170809 12:30	1
18728_ahelc1ub_ahelc1ub9	18728	BNPE	170809 12:30	1
18728_ahelc1ub_ahelc1ub10	18728	BNPE	170809 12:30	1
18728_ahelc1ub_ahelc1ub11	18728	BNPE	170809 12:30	1
18728_ahelc1ub_ahelc1ub12	18728	BNPE	170809 12:30	1
18728_ahelc1ub_ahelc1ub13	18728	BNPE	170809 12:30	1
18728_ahelc1ub_ahelc1ub14	18728	BNPE	170809 12:30	1
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18728_ahelc1ub_ahelc1ub16	18728	BNPE	170809 12:30	1
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18728_ahelc1ub_ahelc1ub18	18728	BNPE	170809 12:30	1
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18728_ahelc1ub_ahelc1ub22	18728	BNPE	170809 12:30	1
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18728_ahelc1ub_ahelc1ub99	18728	BNPE	170809 12:30	1
18728_ahelc1ub_ahelc1ub100	18728	BNPE	170809 12:30	1

**Performance Management Reporting**

[HOME]

Technology | Ethernet Technology | MPLS Technology | System Technology | SDH/SONET Technology | IP Technology

Reports Available:  
 Device View - System Summary  
 Device View - BRAS Subscriber Report  
 Device View - Environmental Stats  
 Device View - Disk Storage Utilization  
 1st Drill Down Level





Info

# #2 "Net.Health 21" Application= WS 21<sup>st</sup> Century Network

Name ^	Device Availability (Percent)		CPU Utilization (Percent)		Memory Utilization (Percent)		NVRAM Utilization (Percent)		Temperature (Celsius)		Voltage Level	
	avg		max	avg	max	avg	max	avg	max	avg	max	avg
BRAS	99.839	●	73.000	4.305	53.000	27.150	--	--	57.00	32.88	9.99	2.47
Broadband Ethernet Aggregator	100.000	●	7.000	0.817	24.000	19.457	2.15	1.89	51.00	25.12	0.00	0.00
Call Server	--	--	--	--	--	--	--	--	--	--	--	--
CMSANs	--	--	57.000	23.438	68.000	55.319	--	--	59.00	46.31	--	--
Edge Ethernet Switch	--	--	--	--	--	--	--	--	--	--	--	--
Ethernet Aggregators	100.000	●	100.000	5.102	8.000	3.583	61.00	16.96	46.00	20.63	--	--
FER	100.000	●	5.000	1.027	24.000	18.849	3.59	2.11	46.00	22.56	0.00	0.00
FMSANs	--	--	--	--	--	--	--	--	--	--	--	--
FSP 150CCf-825	--	--	--	--	--	--	--	--	--	--	--	--
FSP 150CM 4U	--	--	--	--	--	--	--	--	--	--	--	--
FSP 150CPMR	--	--	--	--	--	--	--	--	--	--	--	--
Infrastructure Ethernet	99.015	●	17.000	1.203	28.000	18.802	4.39	1.49	124.90	23.13	0.02	0.00
Infrastructure Ethernet Aggregator	100.000	●	99.000	4.833	7.000	3.480	54.00	18.56	51.00	19.44	--	--
LNS	--	--	--	--	--	--	--	--	--	--	--	--
Media Gateways	100.000	●	11.000	2.321	89.000	33.526	--	--	38.00	25.95	3.34	1.68
P Routers	99.994	●	100.000	1.767	75.000	27.650	75.00	16.72	12.05k	810.36	12.08	2.57
PE Routers	99.983	●	72.000	2.071	100.000	25.368	21.00	14.05	39.00	13.30	12.04	2.45
PMR	100.000	●	--	--	34.000	27.875	34.00	24.45	51.00	26.71	5.32	3.07
SDH	--	--	--	--	--	--	--	--	--	--	--	--
WDM	--	--	--	--	--	--	--	--	--	--	--	--

Export CSV

# #3 – “Yukon” Application = Openreach NGA/FTTC Broadband



- Go Live 2008 (actually started on NH21)
- Simpler network MSANs (Huawei/ECI)
- Simpler OSS integration
- Forecast to grow 5M+
- Proviso 4.4.3
- Full Sun Blade Deployment (T6340 + Sol 10containers)
- PM data used to tune the DSL profiles every day DV-API !!
- First Entirely BT deployment, offshore dev.

**YUKON**  
NGA Performance Monitoring

Welcome Rttuser

System Statistics Port Statistics Throughput Statistics Optical Statistics

Please choose the report you would like to see

**System Utilization Report**  
Essential System Report  
Period Study

System Utilization for DSLAM MA5603T\_NAAAM

Device Availability	
Device	Availability (percent)
611117120_1NAAAAC	100
611117120_1NAAAAC	100.00

ExactCDV

CPU and Memory Utilization						
Device *	CPU Utilization (percent)			Memory Utilization (percent)		
	max	avg	Reported	max	avg	Reported
611117120_1NAAAAC	21.00	12.00	100	36.00	36.00	100
611117120_1NAAAAC	22.00	13.00	100	36.00	36.00	100

ExactCDV

Filter Results

Start Date	End Date	Comment	Time Zone Offset
23/07/10 00:00	24/07/10 00:00	24 hours, 7 days & more	01:00



## #4 – Ontario (GS Managed Services)

- Go Live 16/Feb/2011 !!
- First TNPM 1.3 (offshore dev team)
- Expanded use of self-service (e.g. for threshold setting with properties)
- Sun/Solaris for DC/DM and Intel/Linux for SNMP Pollers

The screenshot displays the BT Probe Admin Report interface. It includes a calendar on the left, a navigation menu, and a main content area with a table of probe configurations. The table has columns for Name, Site Name, Class Name, Threshold Enable, Trap Enable, Jitter Threshold, Round Trip Delay Threshold, Packet Delivery (%), and N/A. The data rows show configurations for various sites and classes, with values for thresholds and delivery percentages.

Name	Site Name	Class Name	Threshold Enable	Trap Enable	Jitter Threshold	Round Trip Delay Threshold	Packet Delivery (%)	N/A
PROBE-bog9-r- techmahind- 01_10.80.161.2_20_jitter	TECHMAHINDRA	20	YES		500	500	90	--
PROBE-bog9-r- techmahind- 01_10.80.161.2_22_jitter	TECHMAHINDRA	22	YES	YES	500	500	90	--
PROBE-bog9-r- techmahind- 01_10.80.161.2_23_jitter	TECHMAHINDRA	23	YES		500	500	90	--
PROBE-bog9-r- techmahind- 01_10.80.161.2_24_jitter	TECHMAHINDRA	24	YES		500	500	90	--
PROBE-bog9-r- techmahind- 01_10.80.161.2_25_jitter	TECHMAHINDRA	25	YES		500	500	90	--



Questions?



Bringing it all together