



Uklight infrastructure update and the Optical Control Plane activity

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What is UKLight ?

- Facility to provide national and international “bandwidth channels” for use by research and e-Science projects
- Deploy transmission equipment to provide our own point-to-point circuits from project use
- Medium term aim: Separate from JANET production network
- Projects can undertake potentially disruptive work without impact on the production IP service
 - Applications with large data-rates (eg 1Gb/s and above)
 - Work with new equipment, protocols etc
- NB not an IP network!
- Links to peer facilities in Europe and US

Principles – transmission infrastructure

- Operating our own transmission equipment
- Use SDH switches/multiplexers to provide circuits across the network
- Full support of Ethernet GFP/VCAT/LCAS ensures bandwidth optimization, service flexibility and interoperability across multi-vendor networks
- Projects will run ethernet / VLANs / IP etc. over their circuits
- Links to concepts for SuperJANET5

Ciena Core Director

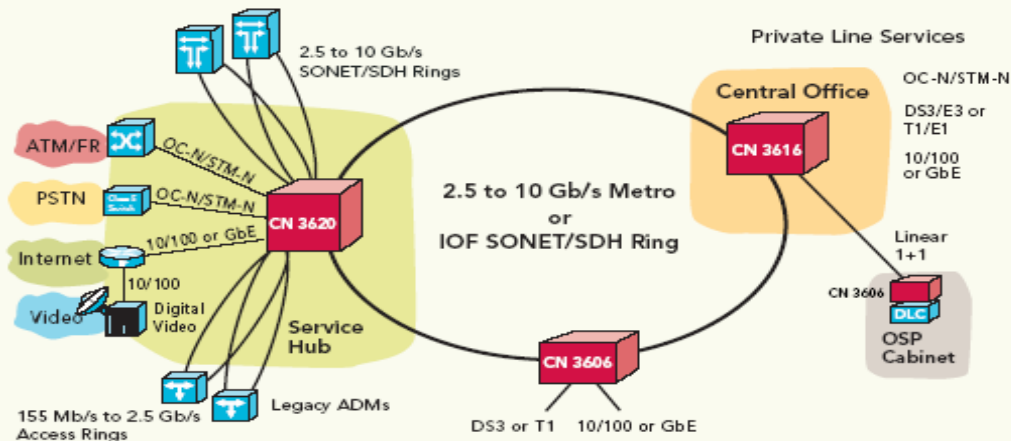
- CDci (the small one)
- Backbone / high density device
- Current Interface Options
 - STM-64 (10Gb/s) (16 max)
 - Gigabit Ethernet
- Switch matrix with VC3 granularity (~50Mb/s)
- Control plane
 - ASON: O-UNI, I-NNI (based on PNNI), E-NNI
 - IETF: GMPLS



Ciena Metro Director

- Used as an edge device
- Interface options
 - STM-64 (10Gb/s) (max 2)
 - Gigabit Ethernet
 - 10/100 Ethernet
 - Local ethernet switch
 - 802.1q VLANs
 - Lower order SDH (below 155Mb/s)
- Switch matrix with VC3 granularity (~50Mb/s)
- No control plane







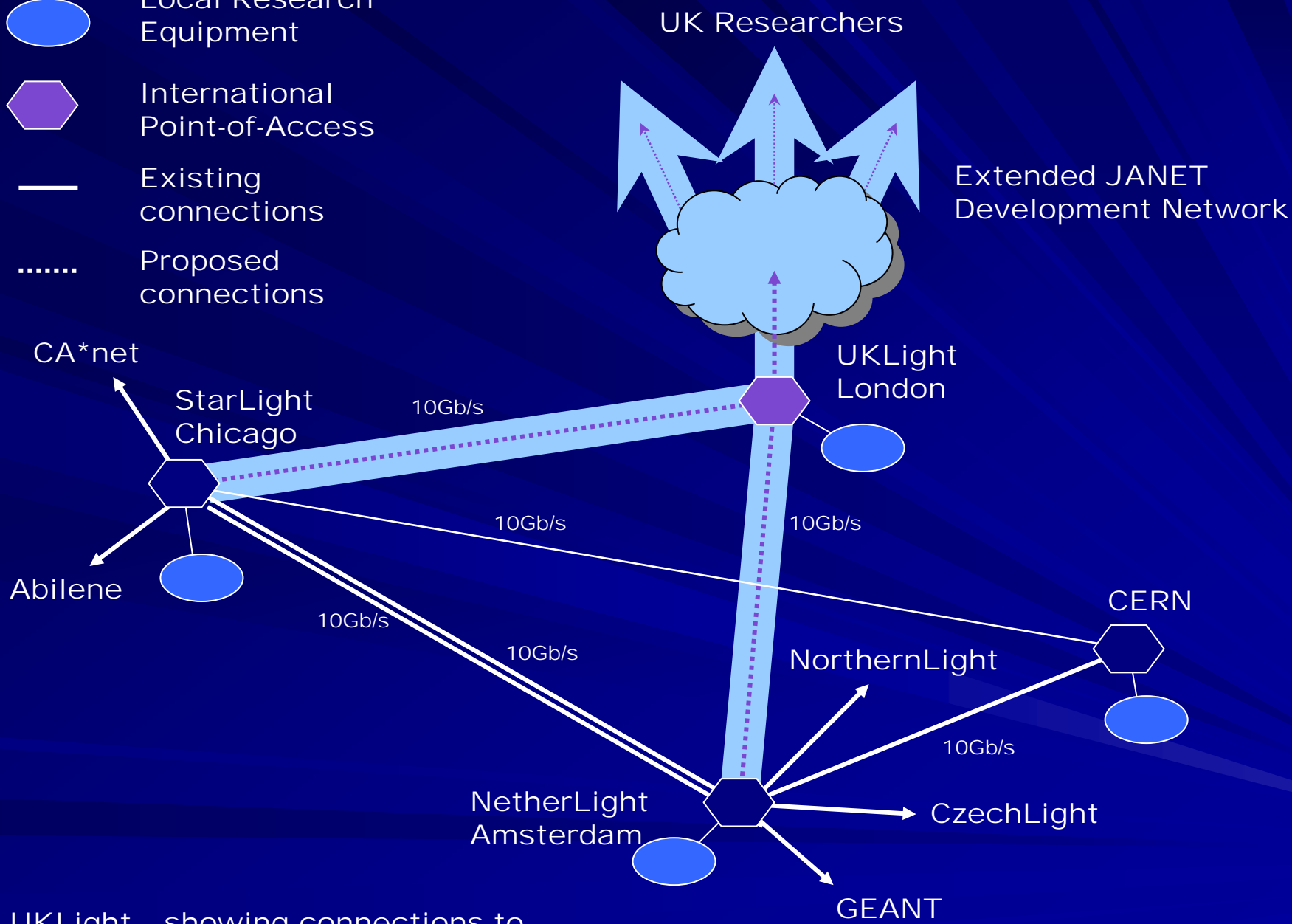


Ciena CN3600

1. “replaces” some of the ‘metro directors’ that do not carry production traffic as richer and thus more suitable for development.
2. SONET/SDH Multiservice Provisioning Platform with industry-leading integrated Digital Cross-connect System (DCS) capabilities
3. Full support of Ethernet GFP/VCAT/LCAS ensures bandwidth optimization, service flexibility and interoperability across multi-vendor networks
4. Control plane deployment:
 1. IETF-GMPLS in progress

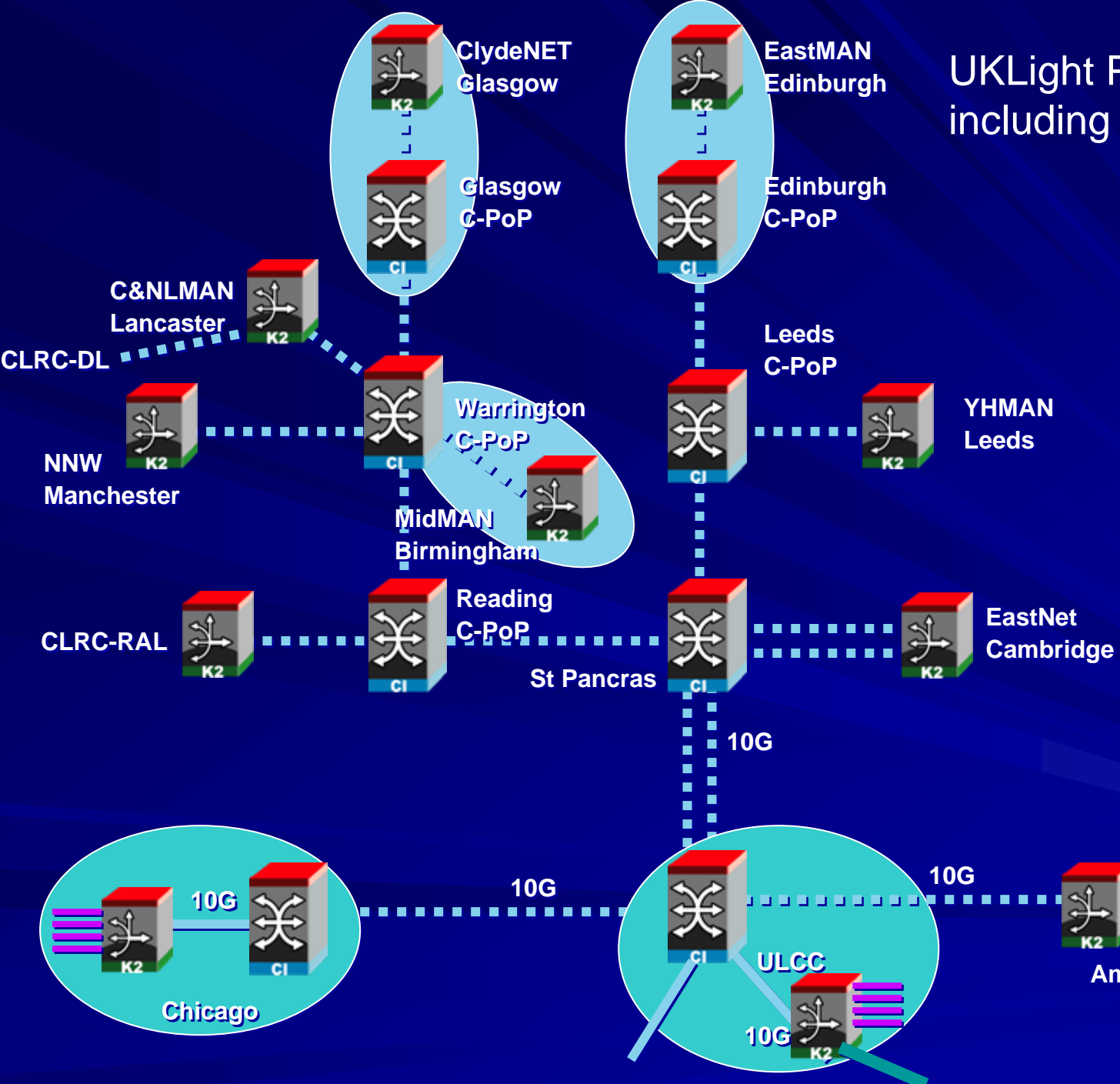


-  Local Research Equipment
-  International Point-of-Access
-  Existing connections
-  Proposed connections



UKLight - showing connections to selected International peer facilities

UKLight Phases 1 & 2, including Phase 3



- Link types:
- STM-framed
 - Dark fibres

The 'extended development' network (Uklight) and the 'IP development' network will merge to form the Super-Janet 5 development network

Facts and control plane constraints

UKLIGHT Facts



1. It is a CIENA network
2. It is an highly flexible and control plane equipped (Ciena I-NNI solution) new gen. SDH network
3. Its clients are Regional networks / end sites
4. Doesn't want to expose itself to the clients

....which leads us to the following.....



1. UNI v1/v2 is the natural solution and it is deployed in the equipment
2. IETF GMPLS can be tried and Ciena supports it but..
 1. Need to play with OSPF-TE areas and instances and FAs to assure client/provider separation
3. GMPLS- client-UNI (*draft-ietf-ccamp-gmpls-overlay-05.txt*) could be tried but
 1. wouldn't speak to the OIF-server-UNI
4. Give a controlled NMS access to client to issue UNI can be tried ('Automated' SPC)
 1. TMF 814 (Corba-based interface)
 2. Web interface as some BIG carriers are now offering it to service providers
5. UCLP (or similar) can be tried if it implements a 'client O-UNI object'. But still some concerns mainly regarding the maturity of such software.

A side-issue.....

- Accessing uklight – ‘Engineering of the edges’
 - Regional_Networks\end_sites are inherently heterogeneous: there is no single solution to (adequately) access the Uklight channels.
 - The edge (regional/end_site) packet network should
 - be bypassed with WDM links when possible
 - implement MPLS Diff Serv aware TE. Anyway, some form of QoS is needed.
 - If Uklight was IETF/GMPLS-enabled then the edge packet networks should ideally deploy at least MPLS
 - (see Otto’s presentation for the MPLS-GMPLS-MPLS migration scenarios – LSPs Nesting with FA-like advertisement of light-paths is appealing....)

Some notes

- The ISOCORE (here in Paris NOW! @ <http://www.caitr.org/internetworking05/index.htm>) and UNH-IOL interoperability events results will drive the test/deployment models as GMPLS/IETF tends to be proprietary
- OIF-UNI v2 provides more access design flexibility as allows G.709 and GE clients
 - Can specify BW inside the Gps connection but can't issue UNI request for flows inside such specified BW (i.e. Ethernet private line service only)
- NNI routing is still far and thus the inter-domain scenarios are currently UNI-constrained
 - Poses some limitations as UNI is unaware of routing info.
- Out of band control plane
 - Some form of IP Tunnelling is necessary to simulate adjacencies as control and data plane topologies can be very different.

Some notes (cont'd)

- Until some UKlight boxes carry production traffic, they may need to be excluded from the light-paths calculation/advertisements
 - GMPLS.....how ?
 - UNI.....how ?
- MSPP features: Bandwidth control with GFP+VCAT+LCAS interoperation
 - LCAS senses the failure of a VCAT component.
 - VCAT, informed, starts to load-balance the Ethernet traffic on the remaining, active virtually concatenated components.
 - GFP senses the VCAT backpressure and ratchets back (since it implements buffers unlike POS's X85)
 - or enables Ethernet 802.3x flow control that stops the source for n ticks.
- Optical VPNs RFCs are worth to be investigated
 - <http://www.ietf.org/internet-drafts/draft-ouldbrahim-ppvvpn-gvpn-bqpgmpls-06.txt>
- Bedtime reading ☺
 - IEEE Communication magazine - GMPLS: The Promise of the Next-Generation Optical Control Plane - **July 2005** Vol.43 No.7



Thank you