

# Point-to-point connections

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Victor Reijs

[victor.reijs@heanet.ie](mailto:victor.reijs@heanet.ie)

# Outline

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- P2P connections...
- Opted features...
- What in definition?...

# P2P connections

- CANARIEpath (The Lightpath)...
- GN2path...
- HOIpath...
- SURFnetpath...
- WINMANpath...
- ASTONchannel...
- Pseudowires...
- ???

# CANARIEpath

## The lightpath

- > analogue wavelength or other unidirectional layer 1 channel that is fixed in bandwidth capacity and cannot be statistically multiplexed, merged, or otherwise modified between any two points in a network
- > A lightpath is an optical circuit
  - > by circuit, mean absence of statistical multiplexing
  - > by circuit, necessarily mean pt-pt
  - > by optical, mean high capacity
  - > by optical, necessarily mean using optical technology (fibres, lasers, etc.)
- > a lambda is a coarse optical circuit

# GN2path

- GN2path is a point-to-point channel, which the NIC sees (or experiences) as a virtual private or dedicated line with a given Service Level Specification guarantee, which we can also call deterministic behaviour.
- There are several ways to engineer a GN2path which include (but are not limited to):
  - Premium IP
  - TDM, WDM
  - MPLS based techniques (I2vpn or similar proprietary ones like CCC and ATOM)
  - any (technically possible) concatenation of the above.

# HOPpath

- A service that will allow applications/transport to push and never worry about loss resulting from this pushing.
- Totally apart from cause of loss, a key property of a HOPpath might be that users of the HOPpath never need to attribute packet loss to congestion.

# SURnetpath

- A SURFnetpath has the following characteristics:
  - No packet re-ordering
  - No packet jitter, as there is no buffering **ever**
  - No drops due to congestion
  - Known end points
- A SURFnetpath can therefore:
  - Bypass firewalls between trusted parties
  - Enable the use of alternate network or transport protocols

# WINMANpath

- A WINMANpath is simply a high-bandwidth pipe, carrying data up to several Gbit/s. It is transparent so a WINMANpath can transfer any variety of bits rates and protocols and can be considered as protocol insensitive. It allows the support of a variety of higher layers concurrently. Some wavelength can carry SDH traffic, whereas other can carry other traffic (like ATM). WINMANpaths can be indifferent to protection.

# ASTONchannel

- The term *channel* is used for describing a link with a certain capacity and QoS between two points. This *channel* can be realized by: a dark fibre, a pure lambda, an optical path, an SONET/SDH container, Ethernet channel, ATM PVC, etc.
- A *channel* is most of the time a dark fibre, an SONET/SDH container or an Ethernet channel. In the future it is expected to be extended to pure lambda's or optical paths.

# Pseudowire

- <http://www.ietf.org/html.charters/pwe3-charter.html>
- mmm

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# Opted features (1/2)

- Point to point (future: point to multi point)
- Dedicated line (not shared by provider; e.g. no bundling in IP premium service)
- Uni directional
- No cloud
- High bandwidth
- Transparent (protocol insensitive)
  - Framing can be restricted
- Indifferent to protection
- Concatenation allowed
- Layer 1, 2 or 3
- Optical circuit

# Opted features (2/2)

- SLS (classification possible)
- Deterministic behavior
- Reserved bandwidth
- No packet re-ordering
- No buffering
  - low packet delay variation
- No drop due to congestion
- No fragmentation
- No statistical multiplexing

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# What in definition?

- Other features:
  - Multi domain SLA
  - E2E (at user layer) SLA (testing)
  - Can be controlled by user
  - Packetization
  - More?
- Evaluate features:
  - Mutually excluding
  - Basically the same
  - Essential
  - Not wanted

# Paradigm shift

- Application adjust to network
  - able to handle (congestion) loss, delay and delay variation
- Network adjust to application
  - Application does not cater for congestion loss, excessive delays and delay variations.
  - File transfer: ZMODEM
- What do we want?

