WAN PHY DEFINITIONS
Adhoc Contributors

Brad Booth  Paul Bottorff
Ben Brown   Roy Bynum
Steve Haddock  David Law
Jeff Lynch   David Martin
Stuart Robinson  Geoff Thompson
Nader Vijeh
Some definitions for us from 802.3 and SONET
‘802.3 MAC’

a) 802.3 standard.
b) MAC client above.
c) Reconciliation sublayer below.
d) Single channel, no multiplexor.
e) Full duplex (for 10GbE), no CSMA/CD.
f) No buffering.
‘802.1D Relay’

a) Connects elements (eg MACs) at MAC-client interface to create a bridge / switch.
b) A MAC client.
c) Packet store and forward (no cut through).
d) Accommodates speed changes port to port.
‘802.3 Repeater’

a) 10, 100, 1000 single speed.

b) Half-duplex, CSMA/CD only (no full-duplex).

c) Shared access to a single channel.

d) Bit store and forward for clock tolerance differences.

e) Fractional packet latency.
‘Path’, ‘Line’, ‘Section’

Note: A Line can be longer than two Sections
‘SONET Regenerator’

a) Full-duplex (dual-simplex).
b) Operates on one and only one wavelength in each direction.
c) Input wavelength equals the output wavelength in each direction.
d) Forward wavelength may or may not equal the reverse wavelength.
e) Couples SONET Sections within a Line.
f) Buffer-less. Pipeline fixed delay. Transmit clock is the recovered receive clock.

continued ...
‘SONET Regenerator’ (cont’)

g) Examines and/or writes SONET section overhead.

h) Payload, Line and Path information are passed through unmodified.

i) Unscrambles and re-scrambles to support g).

j) Keeps output Section active even if input Section fails (fault isolation).

k) This is a ‘3R’ (re-amplify, re-shape, re-time).

l) This is a ‘STE’ (Section Terminating Equipment)
SONET ‘Line Terminating Equipment (LTE)’

a) Everything a SONET Regenerator does plus:
b) Terminates a Line and the associated Section.
c) Source of clock.
d) Multiplexes Paths onto a Line and de-multiplexes a Line into Paths.
e) It is a dual simplex Path mux.
f) Maintenance/Protection switching for muxed Paths between LTEs.
SONET ‘Path Terminating Equipment (PTE)’

a) Terminates a Path and the associated Line and Section.
b) Operates on Local clock.
c) This is where the SONET path overhead is processed.
d) This is the 802.3 WAN PHY.
e) In 802.3 this is the where we attach the Reconciliation sublayer.
f) This is where the 802.3 MAC Frames are mapped into the SONET payload.
‘SONET Transponder’

a) Couples differing optical PMDs back to back.
b) E.G. wavelength 1 to wavelength 2, multimode to singlemode, 850nm to 1300nm.
c) Dual simplex.

‘Passive Transponder’ (emerging term) :
d) Transparently passes all bits (Items a, b, c).

‘Active Transponder’ (emerging term) :
e) This is a special case of SONET Regenerator because of item a).
f) Terminates Section (see Regenerator).
Ethernet on SONET LTE

<table>
<thead>
<tr>
<th>Speed</th>
<th>802.3 PHY</th>
<th>802.3 MAC</th>
<th>802.1D Relay</th>
<th>EoS</th>
</tr>
</thead>
<tbody>
<tr>
<td>10Mb/s</td>
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SONET

802.3 LAN Segment
Ethernet over SONET (2 Port)

OSI Reference Model Layers

Data Link

Physical

LAN CSMA/CD Layers

Higher Layers

Logical Link Control

802.3 MAC

RS

802.3 LAN PCS

802.3 LAN PMA

802.3 LAN PMD

802.1D Relay

EoS

SONET PMA

SONET PMD

SONET Regenerator

802.3 LAN Link Segment

802.3 LAN Segment

SONET

OC192

3R
802.3 WAN PMA
802.3 WAN PCS
802.3 WAN PMA
802.3 WAN PMD

MAC Client
802.3 MAC
802.3 WAN PCS
802.3 WAN PMA
802.3 WAN PMD

SONET PTE

Ethernet Line Termination Equipment (ELTE)

SONET PTE

Ethernet Line Termination Equipment (non-muxed)

802.3 WAN Link Segment

802.3 WAN PMD
802.3 WAN PMA Descrambler
Layer 1 Path Relay
SONET PMA
SONET PMD
SONET

λA

GR253/1377
Full “SONET” spec

OC192
3R

SONET Regenerator

λB

Section
Line

SONET

802.3 WAN Segment
Ethernet Line Termination Equipment (ELTE)
Point to Point SONET Interconnect

WAN PHY

Ethernet LTE

Regenerator

Ethernet LTE

WAN PHY

SONET

802.3 WAN Segment
Dark Fiber

802.3 WAN Segment
DWDM Case

[Diagram showing the DWDM network with nodes labeled WAN PHY, ELTE, DWDM Optical MUX, Regenerator, and SONET.]