

SHDSL Baseline Proposal

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Goals

802.3ah D1.0 has two proposed long-reach copper Ethernet PHYs

- SHDSL (2BASE-TL)
- ADSL – Annex J (2PASS-TL)

We need to make a decision – sooner not later

- Extra (wasted) work
- Lack of focus, lack of direction
- Market confusion
- Won't happen in Hawaii – next chance 2003

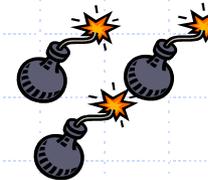
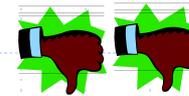
There are many benefits to making a decision!

What is needed in long-reach PHY?

- 1. Must** satisfy long reach objective
 - 2 Mbps @ 2700m
- 2. Must** be spectrally acceptable to carriers in all countries
 - IEEE 802.3 is an international standard
 - If it can't be deployed in North America, how can we accept it?
- 3. Must** support repeaters
 - 2700m is nice but is not 100% coverage
 - Need repeaters to get BW when limited pairs
- 4. Should** degrade gracefully to longer distances while maintaining symmetry
 - 3000m, 3500m, 4000m, 5000m,...
- 5. Should** be independent of VDSL PHY selection
 - No decision yet *anywhere* on DMT vs QAM

ASDL-J

SHDSL



Spectral Compatibility

- How to compare the SC of SHDSL and Annex J using T1.417?
 - Many PSDs to choose for each technology
 - Many basis systems (i.e., victim systems) to choose
 - Upstream versus downstream
 - Different choices can yield opposite results
- Deployment Guideline (DG)
 - The minimum loop length beyond which a PSD is no longer spectrally compatible with all basis systems
 - A worst-case metric for spectral compatibility
- If two PSDs have the same DG, they are considered to be the same spectrally friendly
- Myths
 - *Annex J is more spectrally friendly than SHDSL:* **WRONG**
 - *Annex J does not dump NEXT into access networks:* **WRONG**

Deployment Guidelines of Annex J and SHDSL

Annex J PSD	Deployment Guideline (kft)	SHDSL PSD (kbps)
ADLU-36	11.1	1216
ADLU-40	10.5	1424
ADLU-44	9.9	1616
ADLU-48	9.7	1704
ADLU-52	9.5	1792
ADLU-56	9.2	1928
ADLU-60	8.9	2024
ADLU-64	8.8	2096

Why SHDSL?

We can sit and argue rate/reach curves all day

- Already have many times
- Spinning our wheels isn't the way to go
- Do we really think any decision will be made in Kauai?

Inventing new bandplans is not the way to go

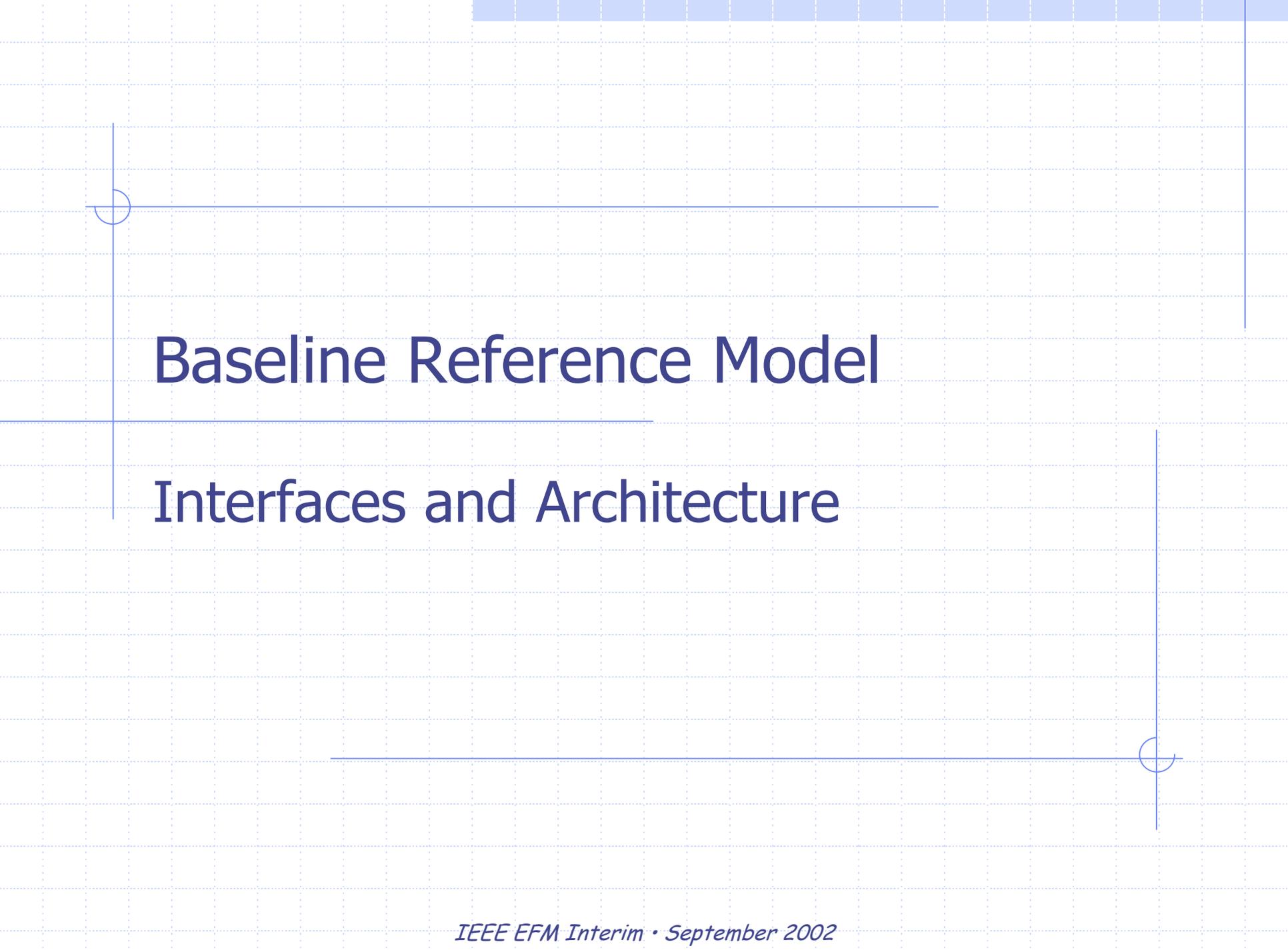
- Need something that's compliant with all basis systems
- Need compliance in all countries
- Carriers aren't up for experimenting

Already have asymmetry covered

- VDSL can cover longer reach asymmetric applications

SHDSL works for the long reach PHY, and works today

- SHDSL satisfies all of the requirements
- SHDSL satisfies all of the additional features



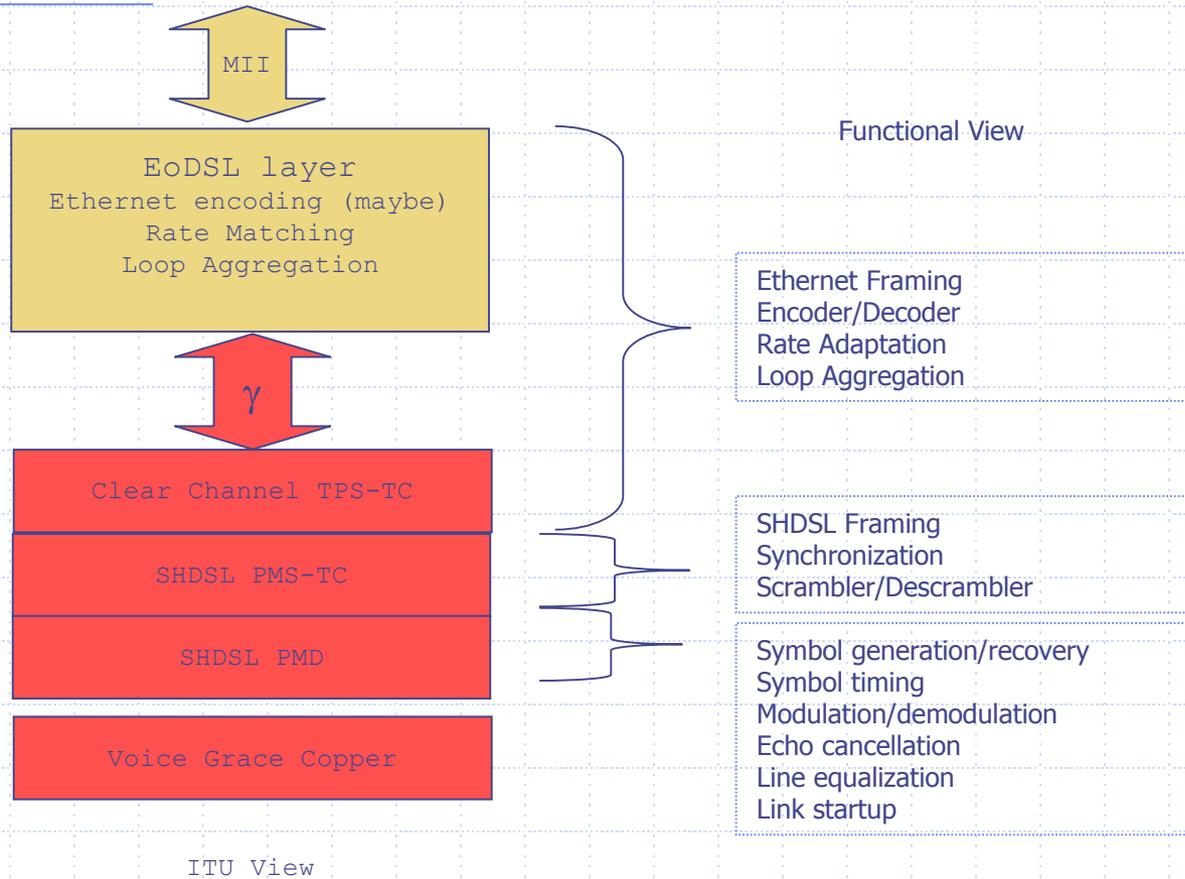
Baseline Reference Model

Interfaces and Architecture

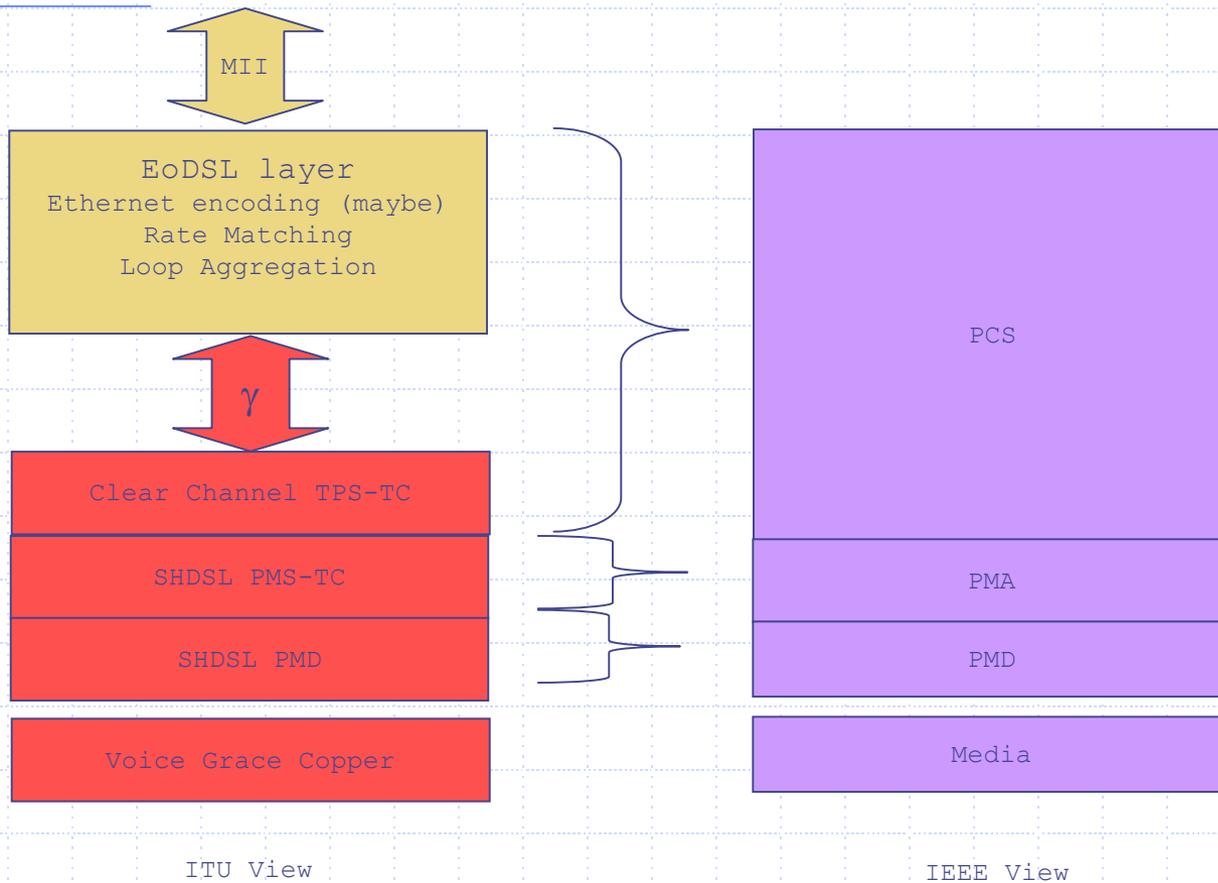
Principles and Strategy

- Require little or no changes to existing standards
 - IEEE
 - ITU
 - ANSI
- Try to keep changes below MAC and above gamma interface
- Specify interfaces and new functionality only (reference rather than duplicate)

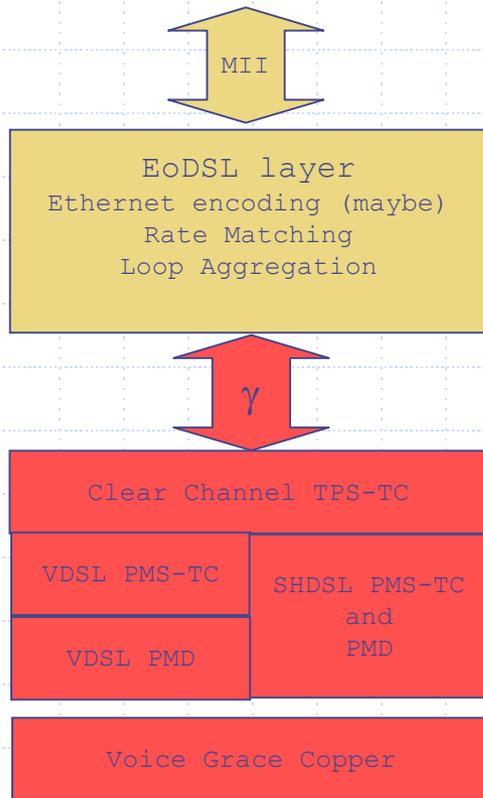
Interfaces and Architecture



Interfaces and Architecture



Interfaces and Architecture

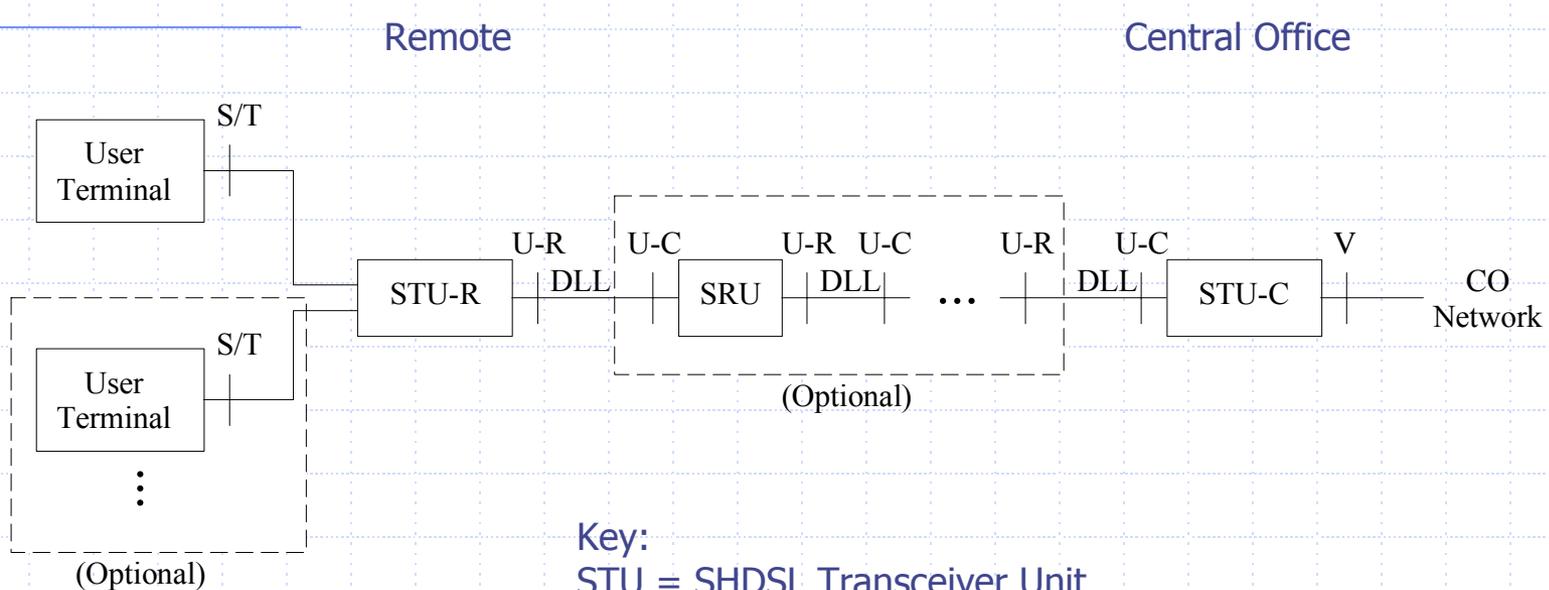


Items in **RED** defined in ITU/ANSI standards

- VDSL (G.993.1) has defined PMS-TC and PMD
- SHDSL (G.991.2) has defined PMS-TC and PMD
- VDSL defines PTM-TC for packet transfer mode
 - Packet interface
 - HDLC byte stuffing
 - HDLC framing
 - HDLC CRC
- Clear channel TPS-TC defined in G.991.2
 - Very simple bit-transfer interface
 - **Not** defined in G.993.1 (VDSL)
 - Provides maximal flexibility to EoDSL layer (bit-pump)
- Decision on HDLC vs 66/64 is independent of TPS-TC
- Decision on loop aggregation is independent of TPS-TC
- Issues: Where does framing and encoding happen? How is it done?

Need a consistent interface (clear channel vs PTM-TC) for all PHYs.

Reference Model



Key:

- STU = SHDSL Transceiver Unit
 - SRU = SHDSL Regenerator Unit
 - STU-C = STU Central Office
 - STU-R = STU Remote
 - U = Loop Interface
 - U-C = U Central Office
 - U-R = U Remote
 - DLL = Digital Local Line
- (Blatantly stolen from G.991.2)

Things to finish...

- Management (MIB, profiles)
 - Requires mapping to SHDSL PMD MIB
 - Profile use same as VDSL
 - EOC parallel for VDSL/SHDSL
- Management interface
 - Need details – need consistency across all EFM PHYs
- Must not operate in 4-wire mode
 - Use 802.3ah loop aggregation instead
- Hooks into G.994.1 for Ethernet handshaking
 - Scott's protocol addressing this
- Link carrier detect after successful completion of xDSL link initialization(?)