

Progress and Challenges for 100 GbE

OIF work on 100G Ultra Long Haul DWDM



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 **OIF** OPTICAL
INTERNETWORKING
FORUM

About OIF

- ◆ Launched in April 1998. It is the only industry group bringing together professionals from the data and optical worlds
- ◆ Open forum: Currently 80+ member companies
 - carriers and network users
 - component and systems vendors
 - testing and software companies
- ◆ Mission: to foster, progress and guide the development and deployment of interoperable products and services for transport networks

Collaboration and Innovation. At Light Speed.

100GE Market

Recent Survey (Heavy Reading Nov. 2007) indicates:

- ◆ 10-15% of operators stated immediate need for 100G
- ◆ Key years for deployment will be 2010-2012
 - Wide scale deployment in backbone networks (37%)
 - Wide scale deployment in metro/regional networks (30%)
- ◆ Only 4% believe backbone mass deployment will be later than 2015
- ◆ 25-30% stated that they “don't know/not sure” regarding deployment time frames

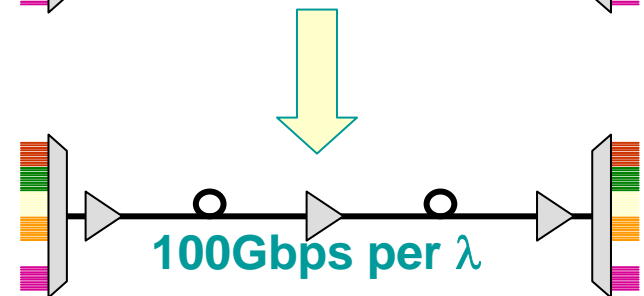
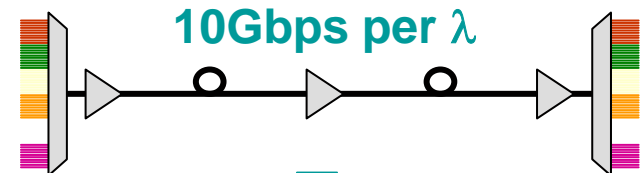
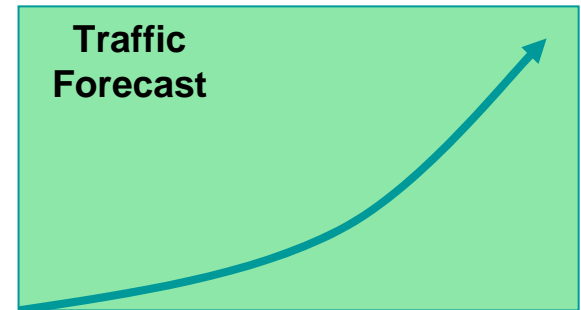
What Tier-1 Carriers are Telling Us

◆ Needs:

- More transport capacity
- Support native 100G signals
 - Big pipes for their routers/switches
 - 100G services

◆ Requirements:

- Capacity efficiency
 - More than 10G, 40G systems
 - On existing infrastructure
 - Typically 80 ch & 1500 KM
- CAPEX benefits
 - lower cost per bit than 10G and 40G
- OPEX benefits
 - Number of systems constant
 - Reduced space and power per bit

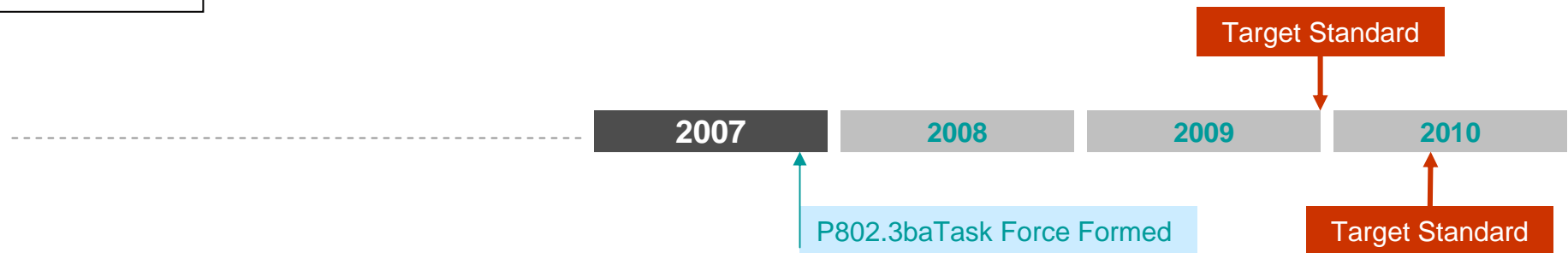


100G Standards

Definition of G.709 OTU4 ITU-T Study Group 15



- Agreement on bit rate - **111.809973 Gb/s**
- Agreement on Inclusion of over-clocked rates (ODU2E) to support 10X10GE in ODU4
- SONET/SDH capped at 40 Gbps



Definition of 40GbE & 100GbE P802.3ba Task Force



- Support a MAC data rate of 40 Gbps and 100 Gbps
- Appropriate support for transparent transport of 40GbE and 100GbE over standard OTN rates
- Provide following physical layer specifications:

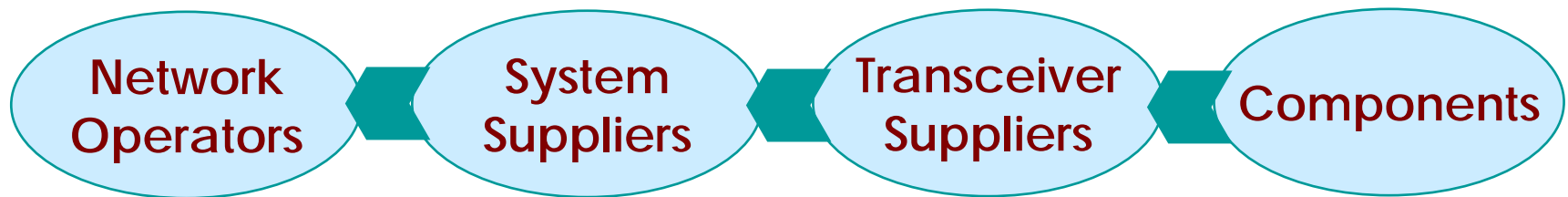
	1m backplane	10m copper	100m MMF	10km SMF	40km SMF
40GbE	✓	✓	✓	✓	
100GbE		✓	✓	✓	✓

Industry Challenges - 100Gb/s

- ◆ Market need exists for 100G
- ◆ Market demands are driving carriers and NE vendors to 100G field trials in advance of standards
- ◆ Some NE vendors are developing first gen 100G product – may not be as compact as carriers need
- ◆ Component/chip suppliers must make significant investments to support 100G in the face of emerging standards, a fragmented customer base and a modest market in the initial years of 100G

OIF Role in 100G

Foster an ecosystem to accelerate the availability of economically attractive 100G transmission solutions for ULH DWDM networks



Approach

- ◆ Choose application target – core backbone networks
- ◆ Build upon IEEE and ITU-T standards
- ◆ Agree on modulation format
- ◆ Identify key technology building blocks and interfaces
- ◆ Develop interoperability agreements among building blocks

100G ULH DWDM

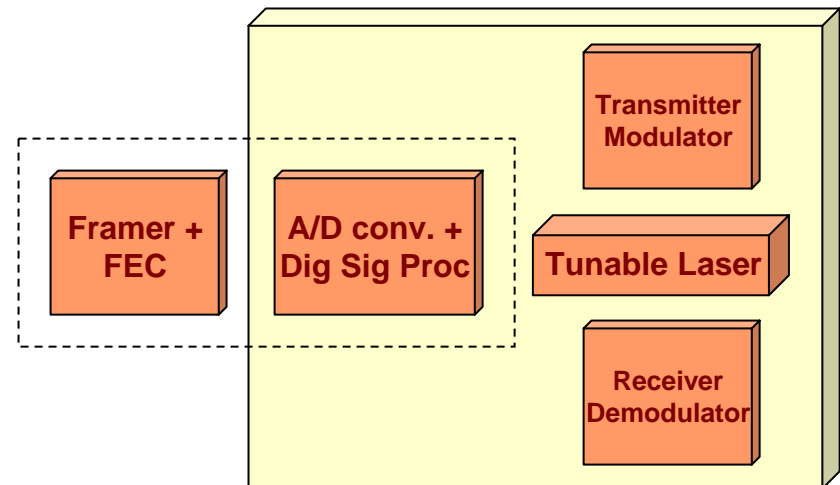
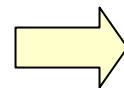
Industry Vision for 100G Transceiver Technology Components

- ◆ Spectrally efficient modulation format
 - Dual polarization with quadrature phase shift keying modulation
- ◆ Coherent receiver technology
 - Improved signal/noise ratio, mitigate transmission impairments
- ◆ Dense photonic module integration
 - Hybrid or monolithic integration to reduce cost, space and power
- ◆ High Performance Forward Error Correction (FEC)
 - Improved coding gain over current 10G systems

**Industry Standard
MSA module**

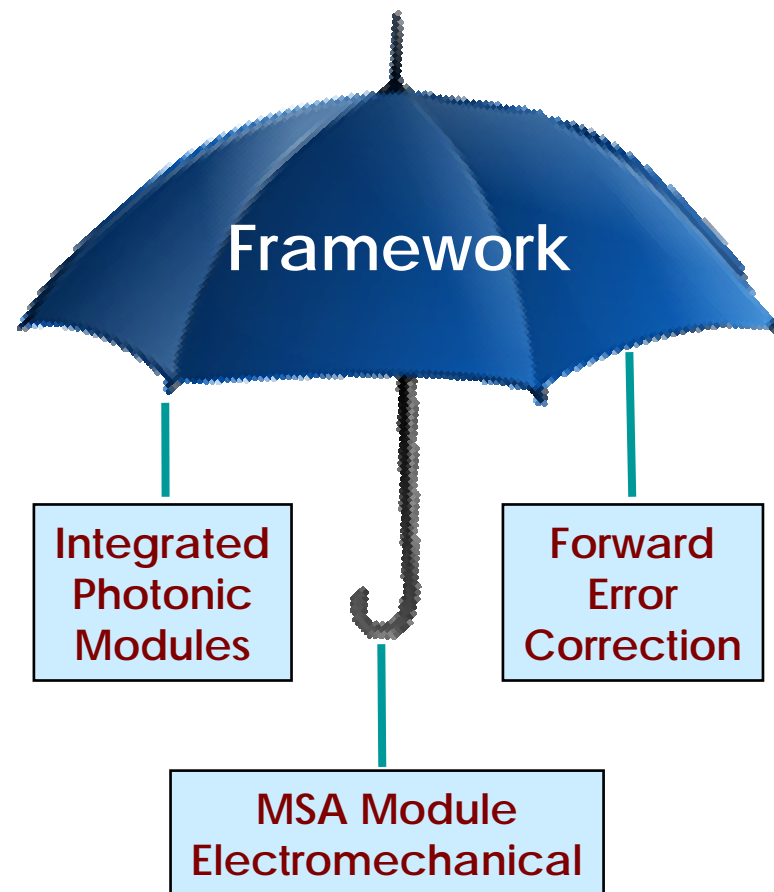
Specifying:

- physical outline
- pin-out
- power dissipation



OIF 100G Project Structure

- ◆ **Framework**
 - Propagation objective
 - FEC coding gain objective
 - Potential DSP requirements
- ◆ **Integrated Photonic Modules**
 - Transmitter Module IA
 - Receiver module IA
 - Foundation for MSA Module IAs
- ◆ **Forward Error Correction**
 - Channel model
 - Encoder specification
 - Interleaver specification
- ◆ **Module - Electromechanical**
 - Mechanical dimensions
 - Electrical connector
 - Max power consumption
 - Communications interface



Thank You for Attending!



For more information on the OIF please visit
www.oiforum.com