Draka Comteq Presents:

The MaxCap multimode Fibre for 10 Gb/s Applications

Draka Comteq

Introduction

- IEEE 10 Gb/s standard
- Source and Fibre Test Method
- Next generation multimode fibres
- Results
- Conclusions

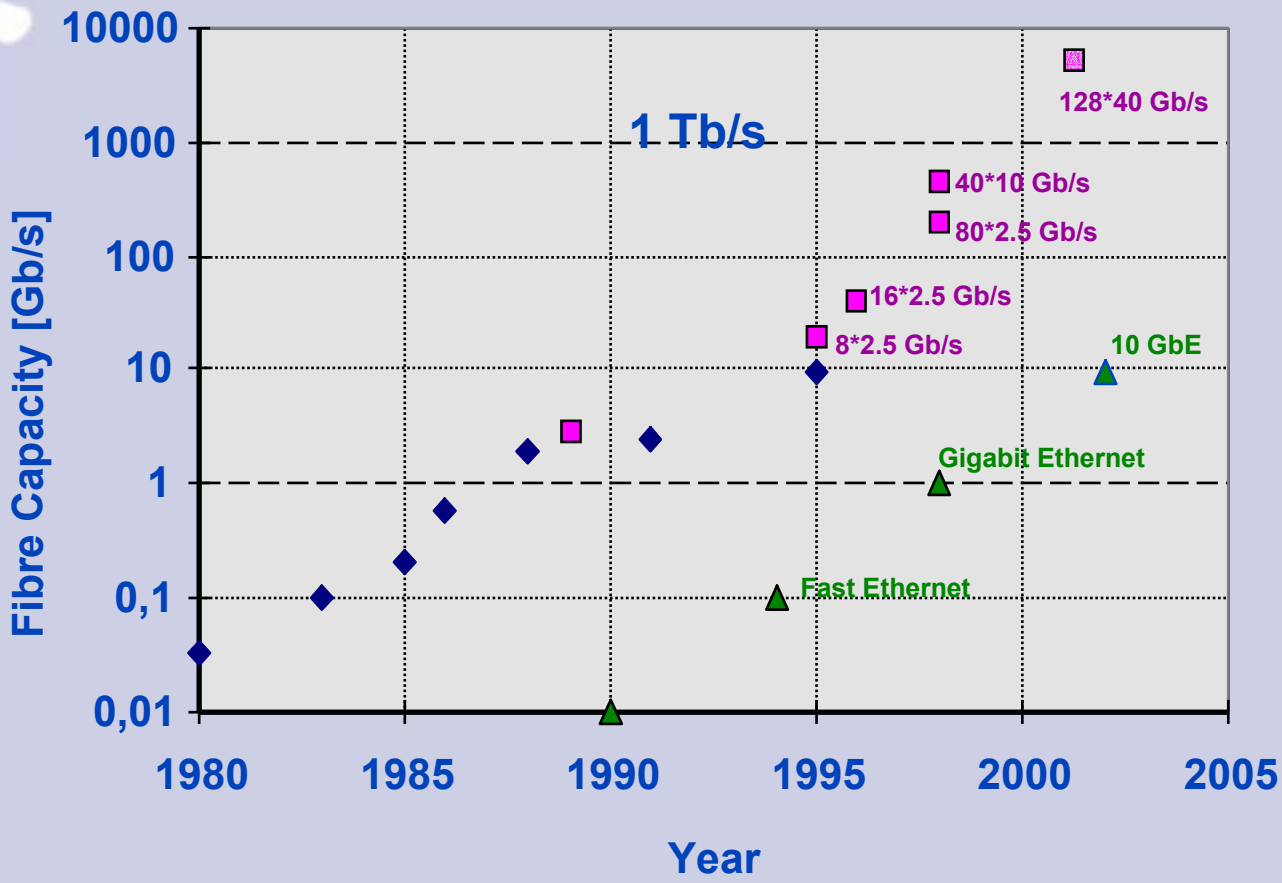
Why new standard?

Increasing bandwidth demands drive need for low-cost, short-distance 10 Gb/s connections in:

- LAN building backbones
- Storage Area Networks (SAN)
- Telecom Central Office interconnects

Draka Comteq

Fiber capacity evolution



Telecom:

- Single Channel
- WDM (n-Channels)

Datacom:

- IEEE Ethernet

Draka Comteq

IEEE 802.3ae 10 GbE (2000-2002)

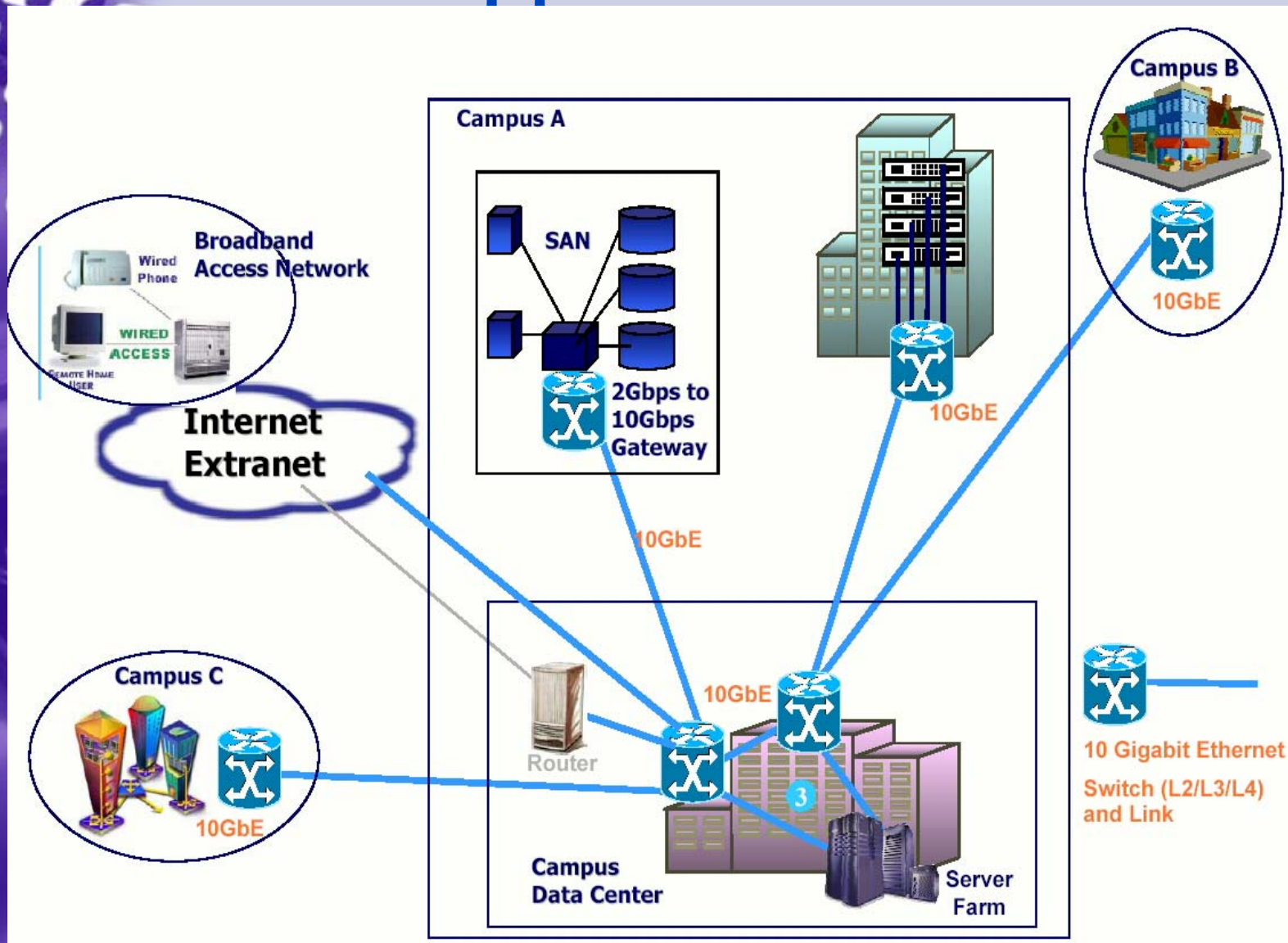
4 PMD (Physical Medium Dependent) interfaces:

• 1550 nm Serial		SM (40 km)
• 1310 nm Serial		SM (10 km)
• 1310 nm WWDM	MM (300 m)	SM (10 km)
• 850 nm Serial	MM 62.5 um legacy:	26 / 33 m
	MM 50 um legacy:	66 / 82 m
850 nm Serial	MM 50 um NextGen:	300 m

⇒ *Most cost efficient solution !*

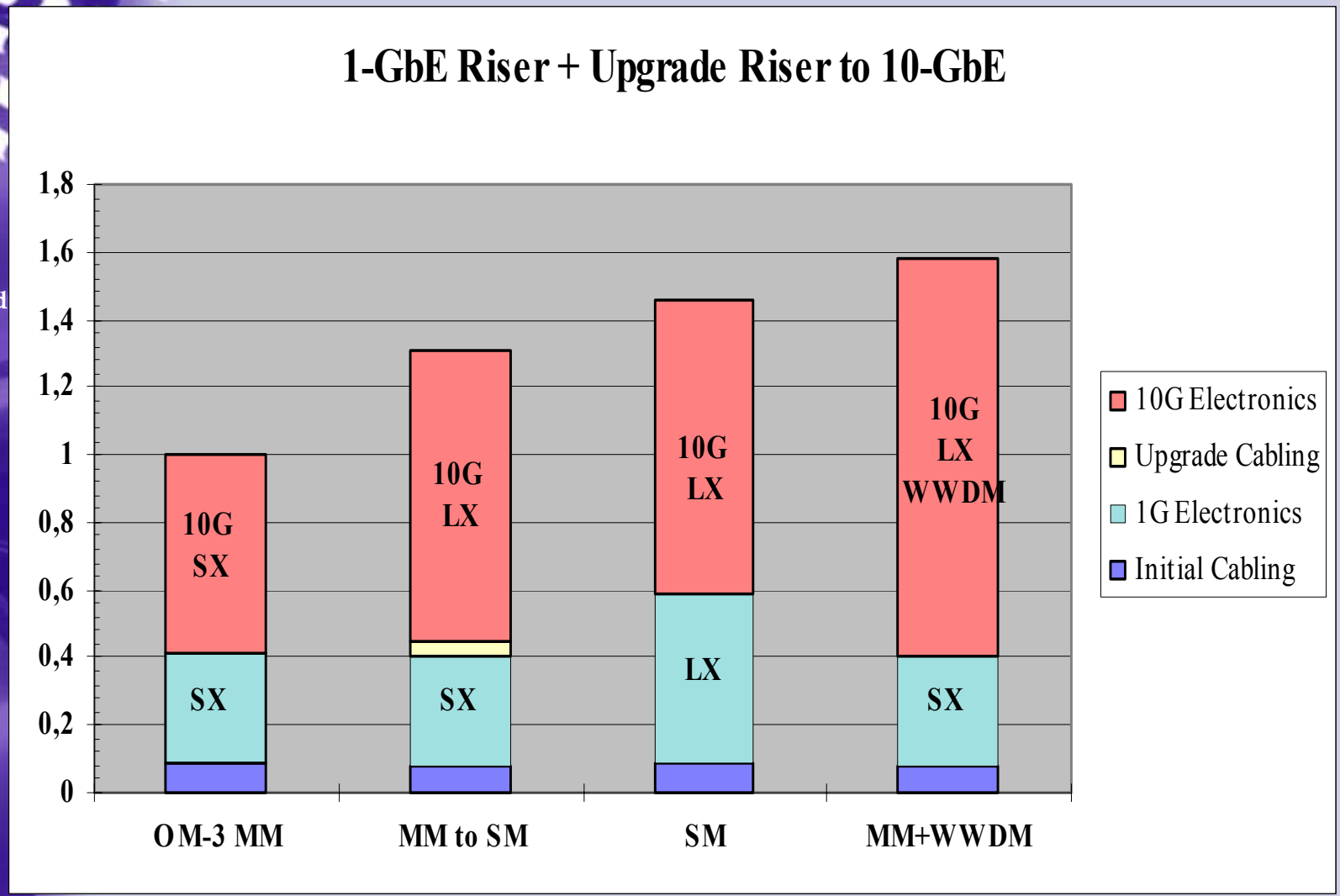
Draka Comteq

LAN Applications



Draka Comteq

System upgrade cost



Ref.: Kolosar, IEEE 802.3ae, Int. meeting Ottawa, May, 2000.

Requirements source / fiber

- IEEE 802.3ae:
  Defined Effective Modal Bandwidth (EMB):
  ⇒ 2000 MHz.km @ 850nm
- TIA FO 2.2.1:
  Source: Encircled flux specification
  Fiber: DMD specification

Draka Comteq

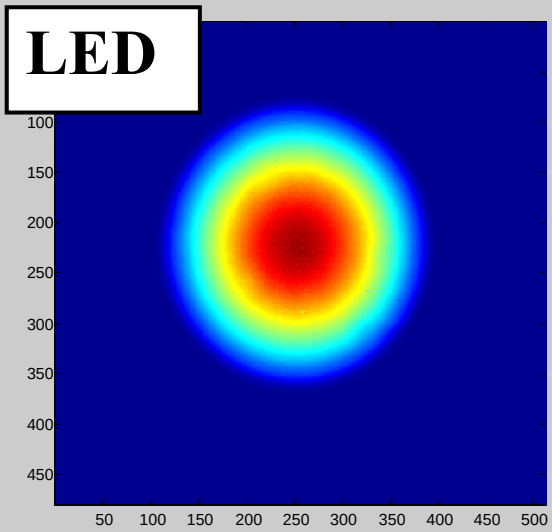
Requirements source / fiber

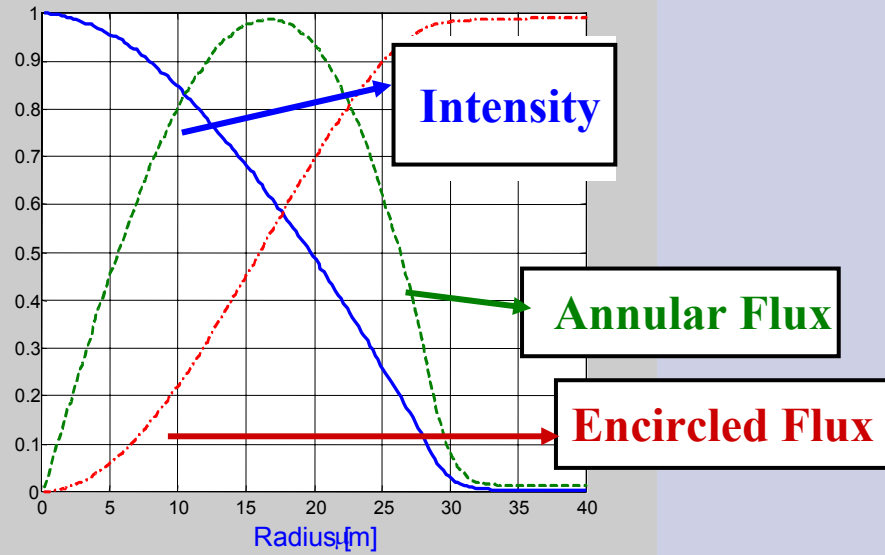
- **Source: Encircled Flux spec. @ 850 nm:**
  - *** At 19 µm radius: ≥ 86% (*not too large*)**
  - *** At 4.5 µm radius: ≤ 30% (*not too small*)**

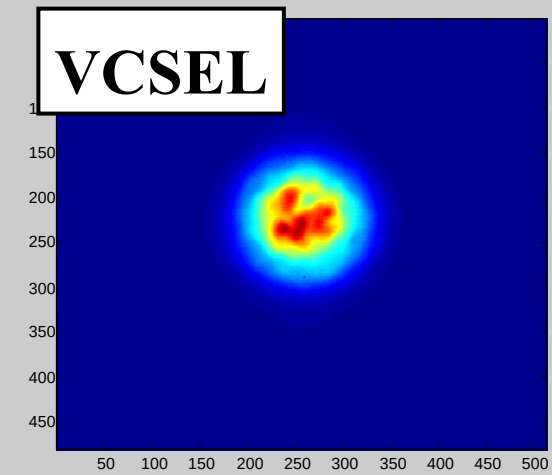
- **Multimode fibre: DMD spec. @ 850 nm:**
  - *** 6 different templates (*trade-off in fibre*)**
  - *** OFL bandwidth: 1500 / 500 MHz.km**
    (*No RML bandwidth defined*)

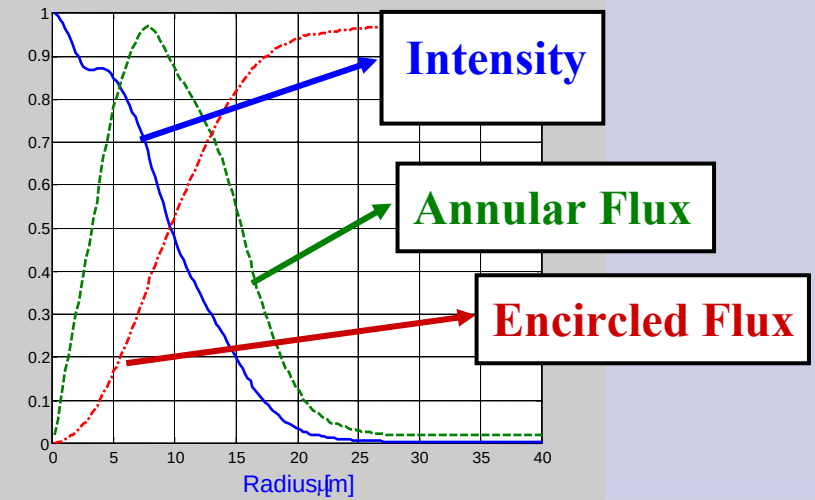
Draka Comteq

Encircled Flux



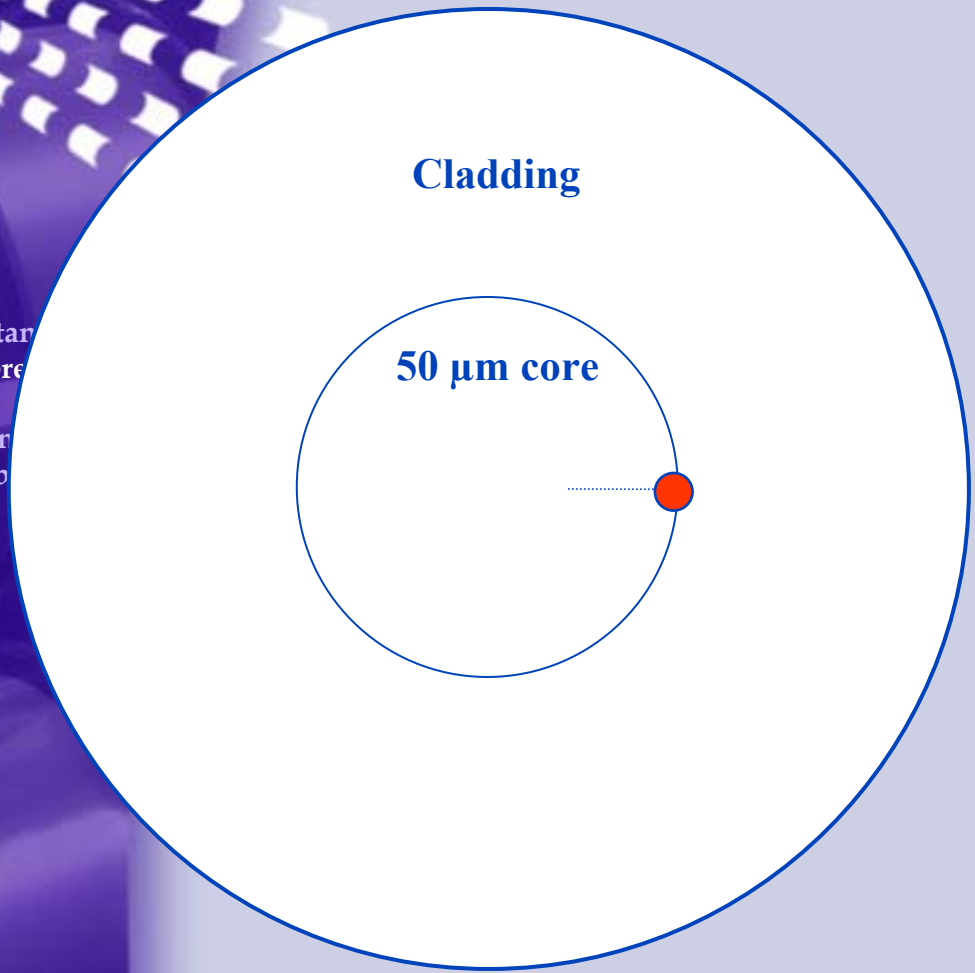




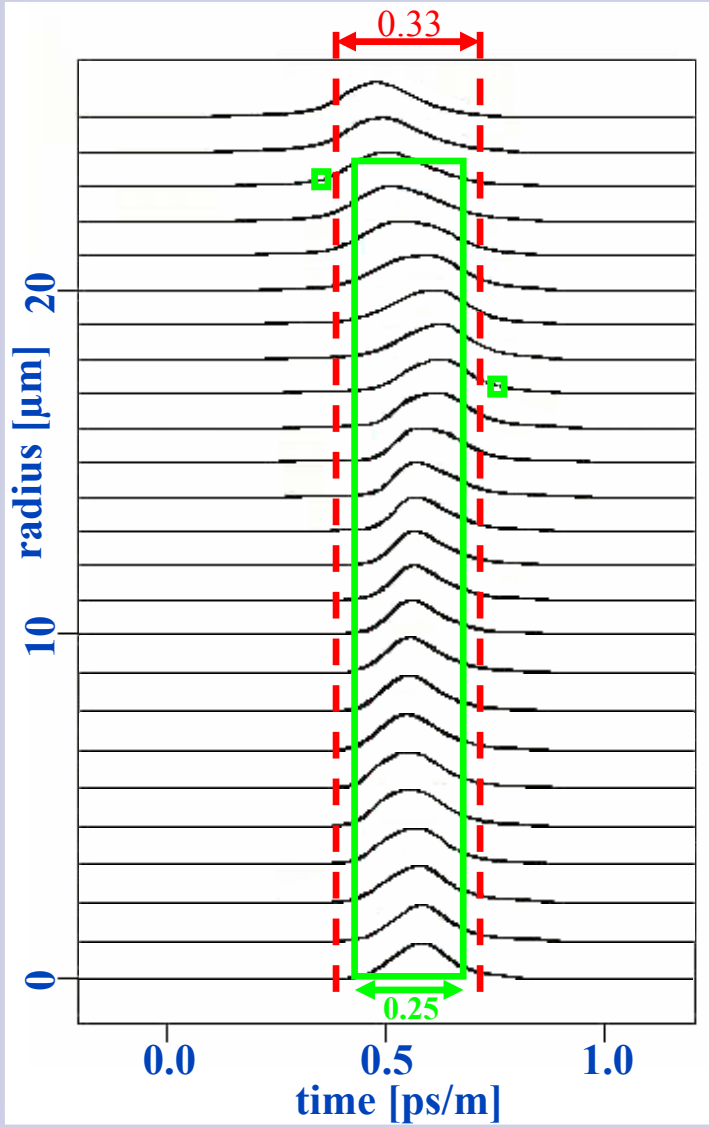


Draka Comteq

DMD measurement



DMD measurement result



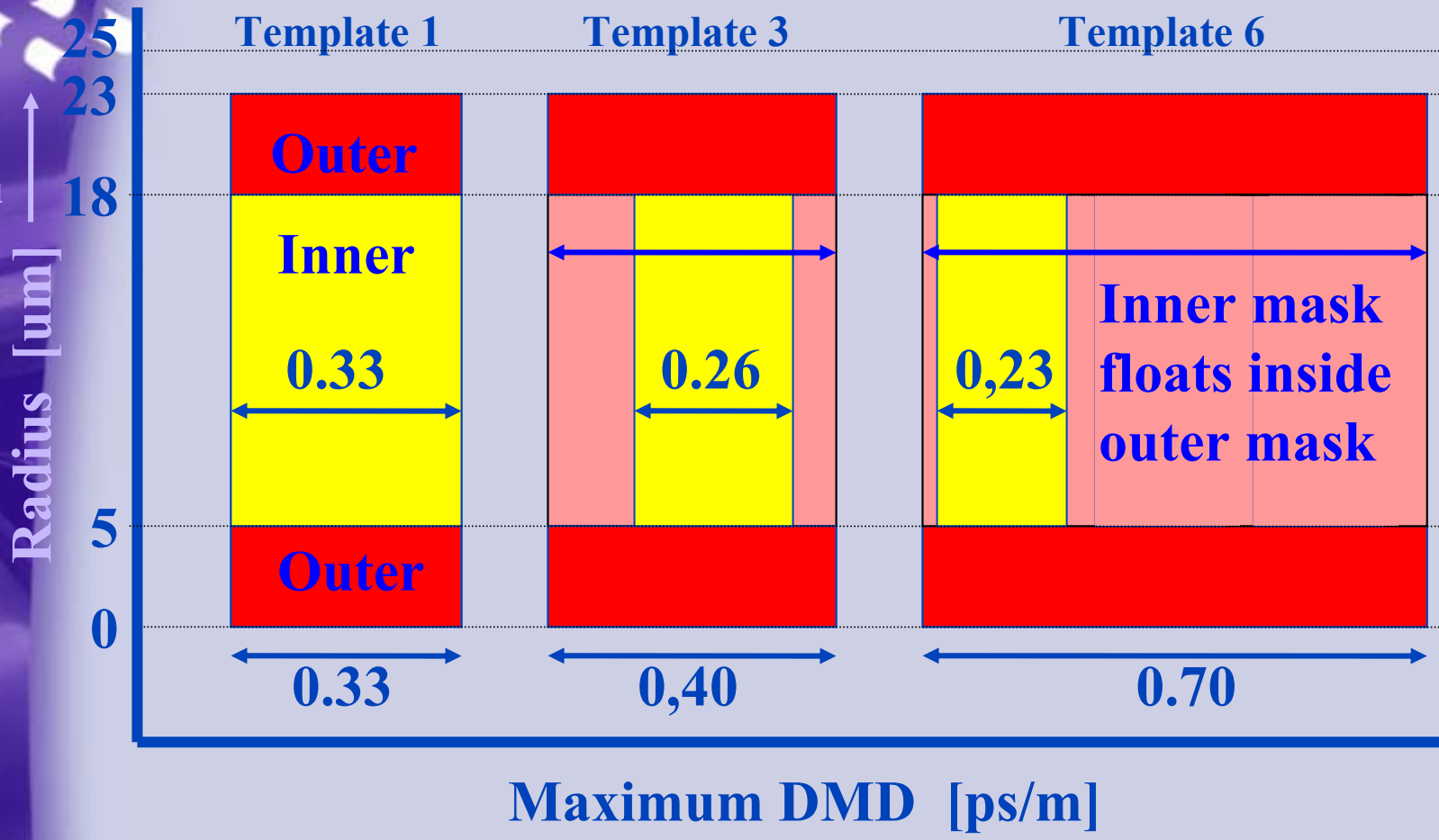
Draka Comteq

Six "floating" DMD templates

Maximum DMD at 850 nm [ps/m]		
Template	Inner Mask (Radius 5 to 18 µm)	Outer Mask (Radius 0 to 23 µm)
1	≤ 0.33	≤ 0.33
2	≤ 0.27	≤ 0.35
3	≤ 0.26	≤ 0.40
4	≤ 0.25	≤ 0.50
5	≤ 0.24	≤ 0.60
6	≤ 0.23	≤ 0.70
Meeting at least one template is sufficient		

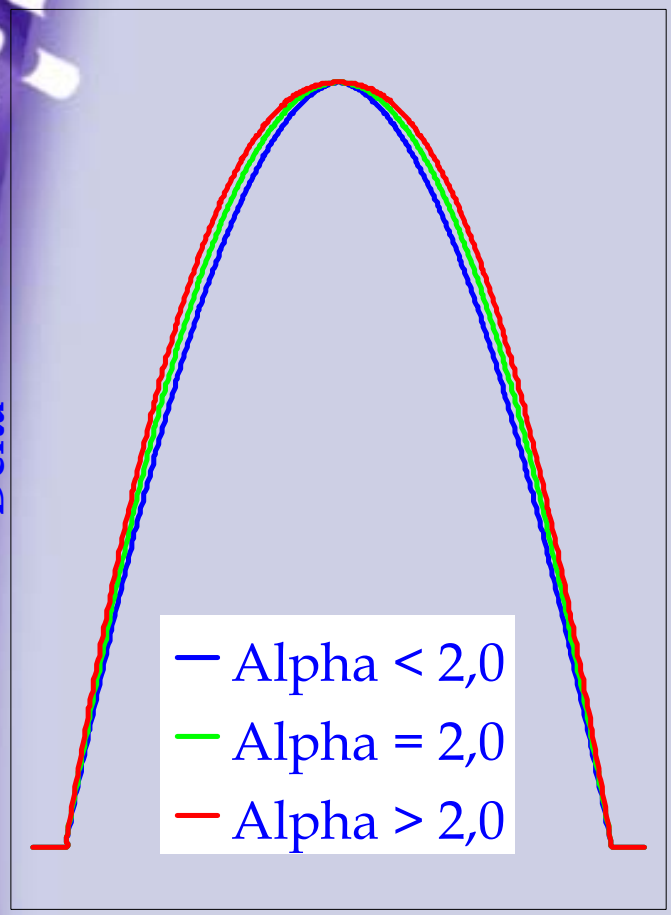
Draka Comteq

Examples of templates



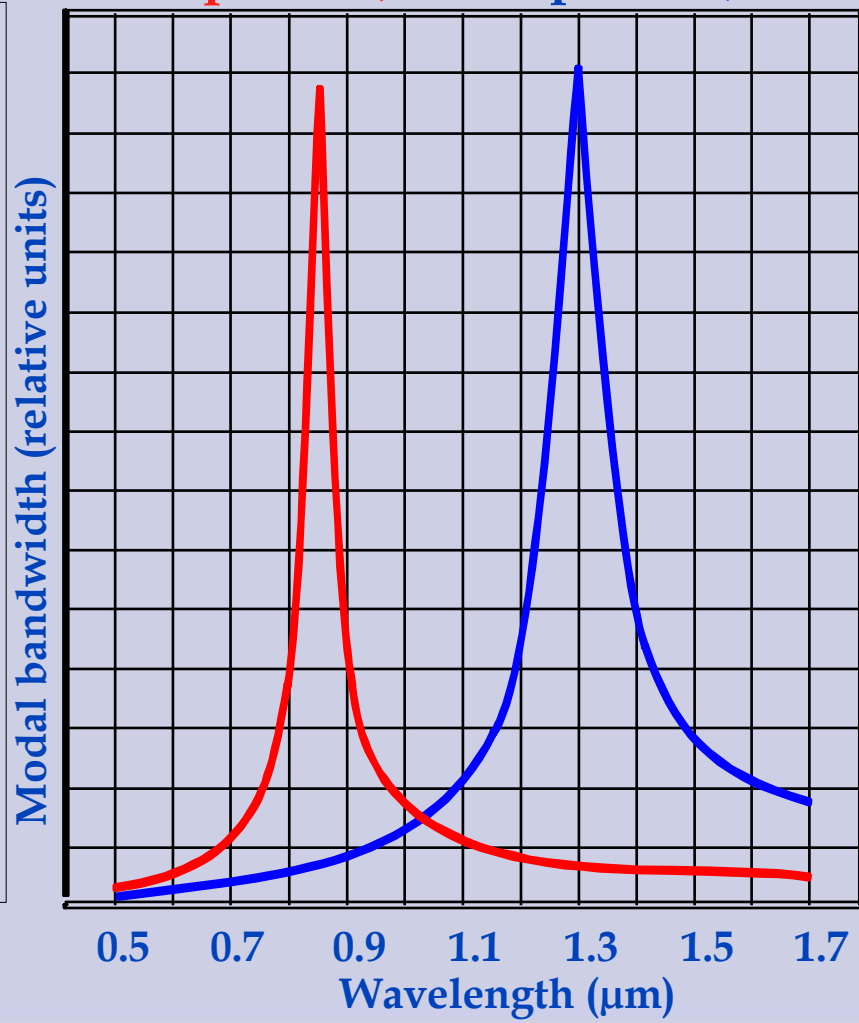
Draka Comteq

Fiber profile design



850nm optim. MaxCap alpha = 2,04

1300nm optim. HiCap alpha = 1,94



Draka Comteq

Draka Comteq Solution

Draka Fibre Technology / Draka Comteq supports 10 Gb/s MMF applications with:

MaxCap multimode fibre

MaxCap MMF Performance

	MaxCap 300	MaxCap 150
10GBASE-SX:	300 metres	150 metres
EMB 850 nm:	2000 MHz.km	950 MHz.km
OFL BW 850nm:	1500 MHz.km	700 MHz.km
OFL BW 1300 nm:	500 MHz.km	500 MHz.km

Two quality classes:

⇒ *compatibility to legacy applications*

Draka Comteq

MaxCap MMF Performance

Standardisation:

The MaxCap 300 MMF complies with:

- **TIA/EIA-492AAAC Fibre Specification**
- **ISO/IEC 11801: type OM-3**

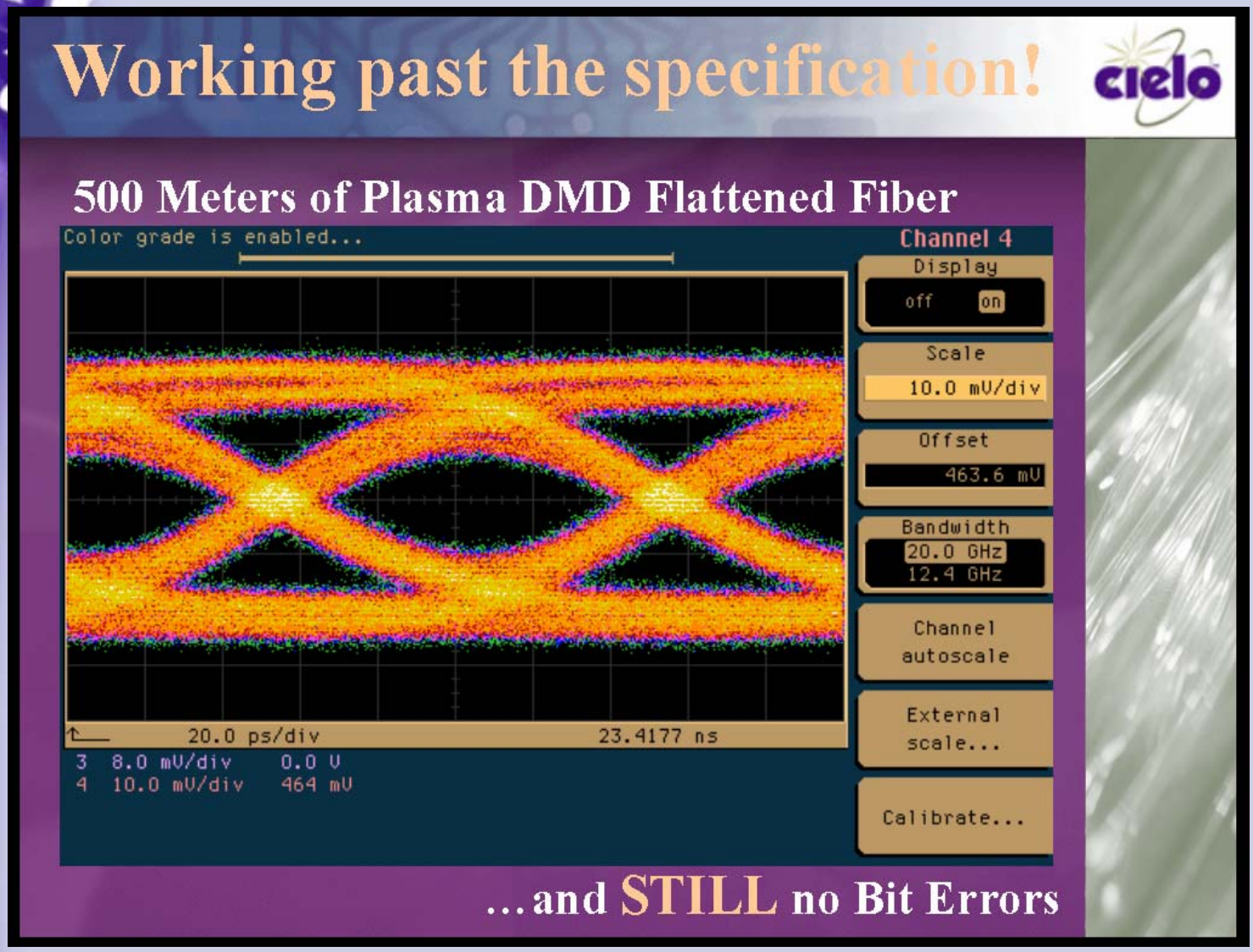
Draka Comteq

MaxCap MMF Performance

		MaxCap 300	MaxCap 150
850 nm (SX):			
10GBASE-SX	*10 Gb/s*	300 m	150 m
10G-SX4	*3,125 Gb/s*	550 m	450 m
1000GBASE-SX	*1 Gb/s*	900 m	800 m
LEDs	*100 Mb/s*	300 m	300 m
1300 nm (LX):			
10GBASE-LX4	*3,125 Gb/s*	300 m	300 m
1000BASE-LX	*1 Gb/s*	550 m	550 m
LEDs	*100 Mb/s*	2000 m	2000 m

Draka Comteq

System tested:



Draka Comteq

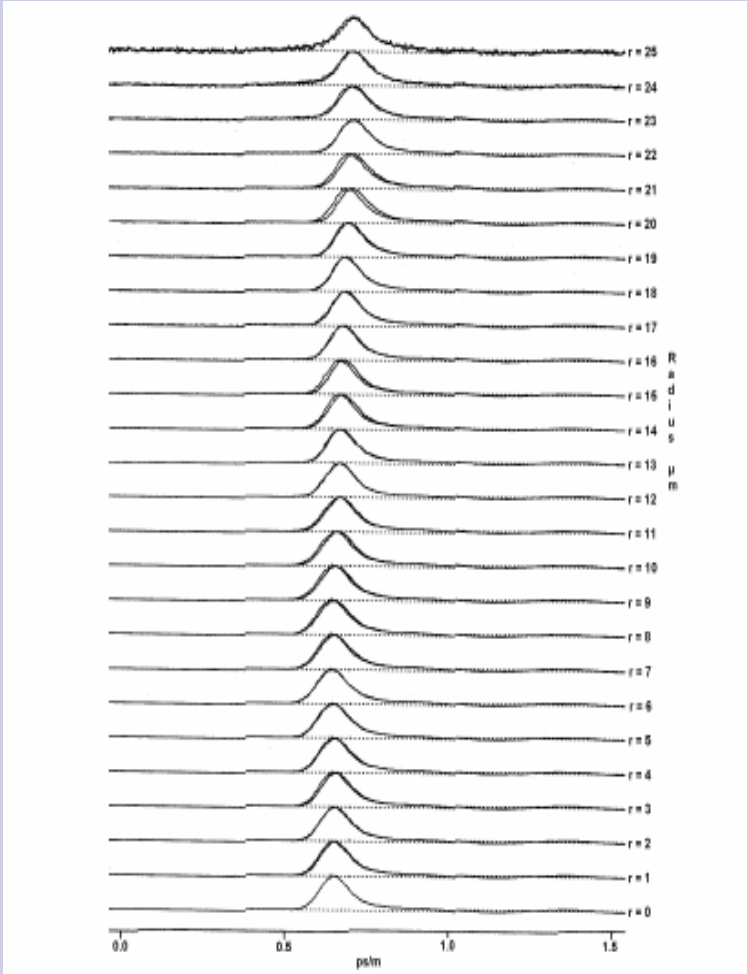
Way beyond specification:

IBM test:

~~15~~6 20 Gb/s
over 1 km

Paper: ECOC A'dam

September 2001



Summary

- MaxCap MMF supports cost efficient 10GbE serial @850 nm in 2 quality classes: 300 m and 150 m
- MaxCap MMF complies with TIA 492-AAAC and IEC/ISO OM-3
- MaxCap MMF offers backwards compatibility from 10 Mb/s to 10 Gb/s over 300 m

Draka Comteq

Your partner in quality fibre and cable solutions