
Rate Preset as Appropriate Support for OTN

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Goals of this Presentation

Proposes “Rate Preset” as one of appropriate supports for OTN

Indicates that it needs fine granularity of IPG-Stretch parameter for good data-rate control



Appropriate Support for OTN

HSSG adopted an objective in July 2007

“Provide appropriate support for OTN”

-It requires a rate matching between Ethernet and OTN

We have proposed “Rate Preset”

for easy accommodating of Ethernet into OTN [1, 2]

[1] kobayashi_01_0407.pdf

[2] ishida_01_0507.pdf

-It is suitable for effective data-rate control

-Base function has already been standardized in IEEE802.3ae



Why do we need Rate Preset to support OTN?

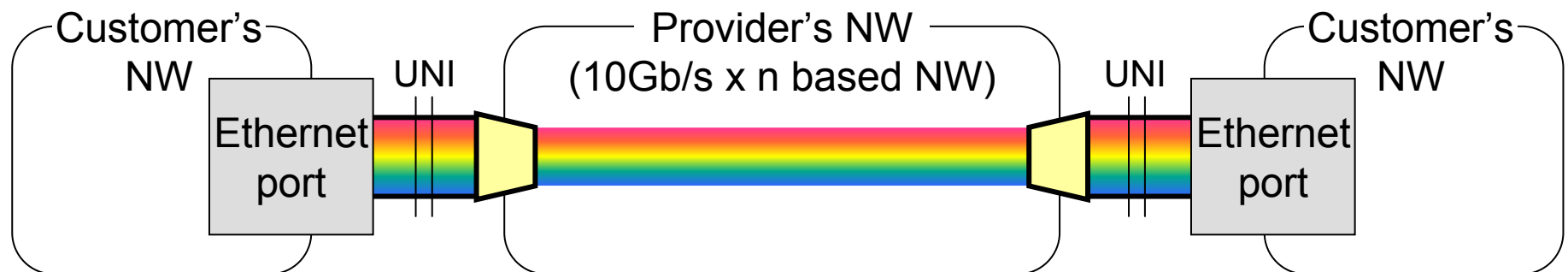
- OTN just provide “wire” between two Ethernet ports
- It's easy to answer to customer's requirements

Network providers build 10Gb/s x N transparent networks

- DWDM systems, RODAM systems, ..
- High quality transport services but expensive

Rate Preset adjusts effective data-rate independent of Ethernet PHY

- It is easy to provide services in answer to customer's requirements

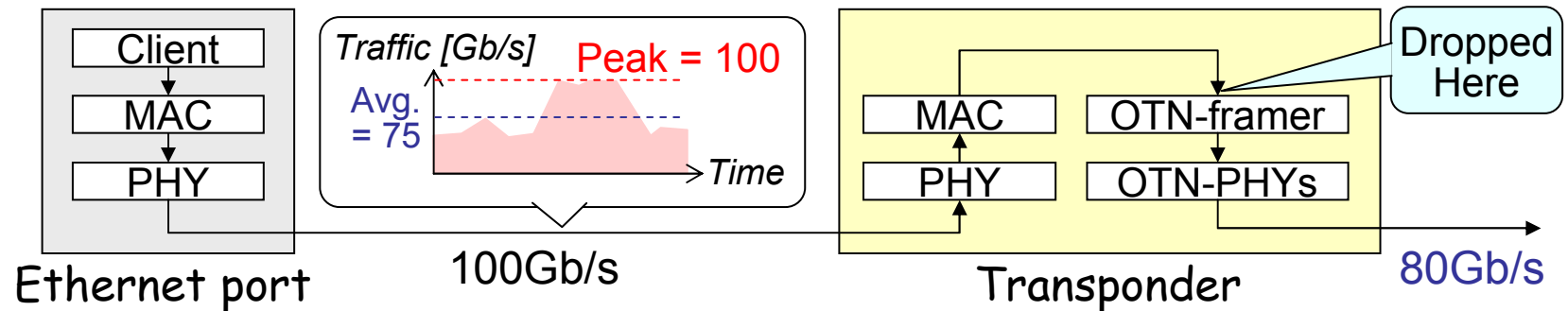


How does Rate Preset work?

It prevents unnecessary frame losses

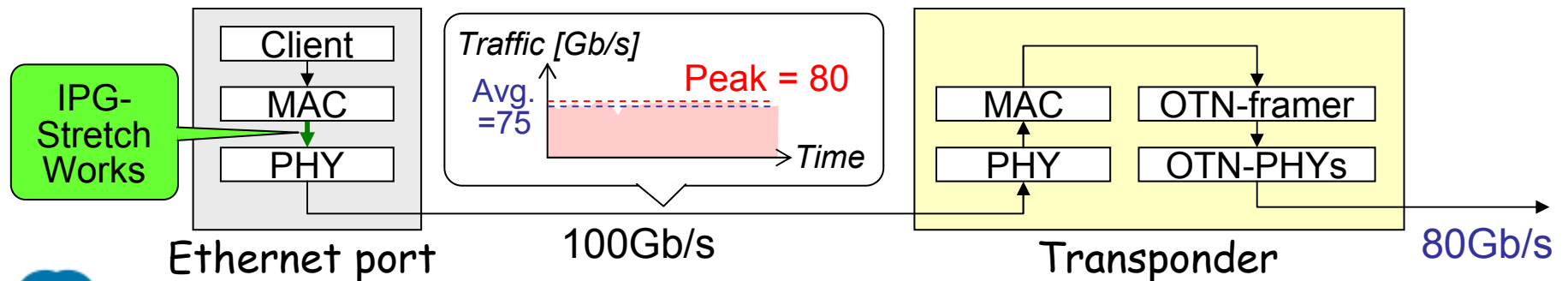
Without Rate Preset

Some Ethernet frames may be dropped when burst traffic occurs



With Rate Preset

All Ethernet frames can be transmitted with OTN



Adapted Data-rate with Rate Preset

Relationship between adapted data-rate and IPG stretch parameter
Based on Clause 4 in IEEE802.3ae and 802.3ar/D1.3

		40GE (40.0 Gb/s)			100GE (100 Gb/s)					
		[20G]	[30G]	[40G]	[50G]	[60G]	[70G]	[80G]	[90G]	[100G]
OTN Services		OPU2 x 2	OPU2 x 3	OPU3	OPU3 + OPU2	OPU3 + OPU2 x 2	OPU3 + OPU2 x 3	OPU3 x 2	OPU3 x 2 + OPU2	OPU3 x 2 + OPU2 x 2
(Payload bit-rate [Gb/s])		(19.99)	(29.98)	(40.15)	(50.14)	(60.14)	(70.13)	(80.30)	(90.29)	(100.2)
802.3ae	Data-rate [Gb/s]	18.66	28.96	38.93	46.66	57.89	68.00	77.77	87.50	97.25
	(*PHY-rate [Gb/s])	(19.25)	(29.87)	(40.15)	(48.12)	(59.70)	(70.12)	(80.20)	(90.23)	(100.2)
	Parameter (1)	7	21	292	7	11	17	28	56	283
802.3ar /D1.3	Data-rate [Gb/s]	19.35	29.07	38.93	48.59	58.59	68.00	77.85	87.55	97.25
	(*PHY-rate [Gb/s])	(19.95)	(29.98)	(40.15)	(50.11)	(60.12)	(70.12)	(80.28)	(90.29)	(100.2)
	Parameter (2)	240	681	9348	242	358	544	900	1801	9061

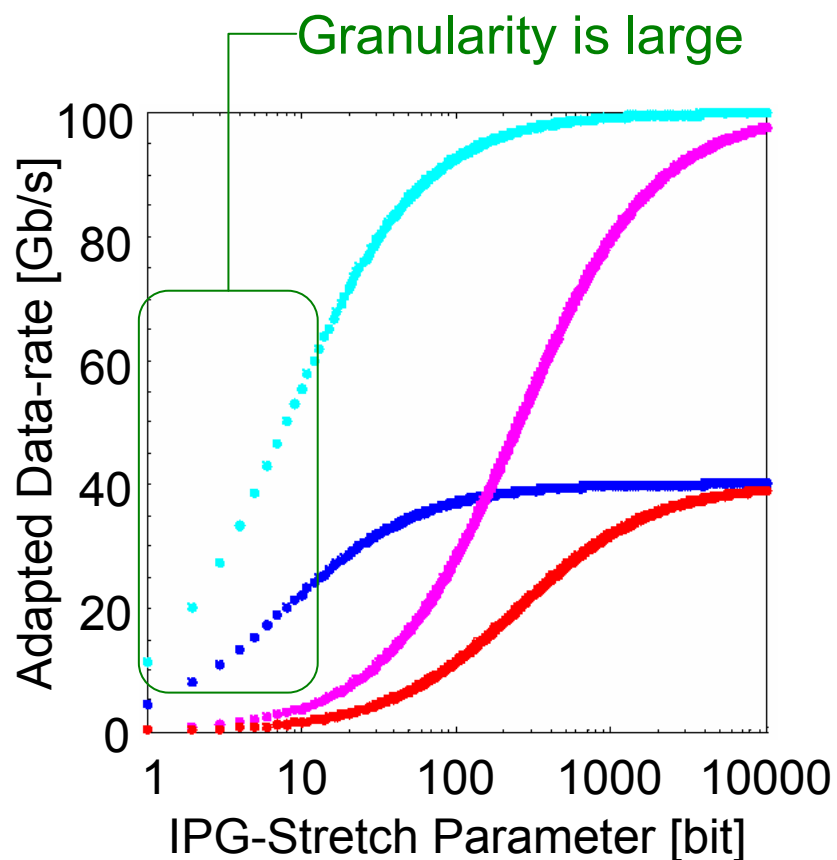
*PHY-rate = Adapted Data-rate x 66/64
IPG Stretch Parameter
Parameter (1): *ifsStretchRatio* [bit]
Parameter (2): *txIpgStretchRatio* [bit]

Payload nominal bit-rates (See ITU-T G.709)
OPU2 = 9.995276962Gb/s
OPU3 = 40.150519322Gb/s



Granularity of IPG-Stretch Parameter

Fine granularity of IPG-Stretch parameter is preferable



Base on Clause 4 in IEEE802.3ae

- : 40GE
- : 100GE

Base on Clause 4 in IEEE802.3ar/D1.3

- : 40GE
- : 100GE



Summary

“Rate Preset”

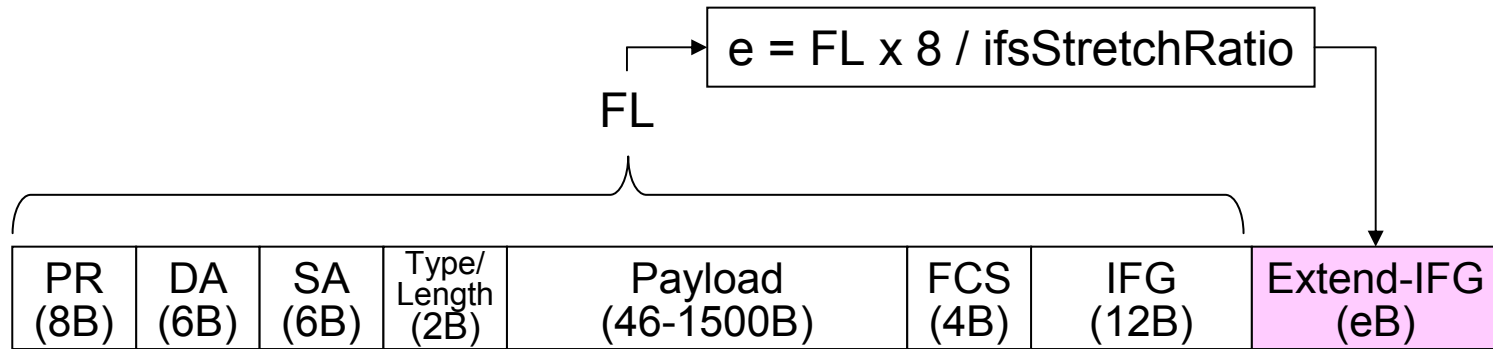
- Provides one of appropriate supports for OTN
- Is very useful in provider’s services
- needs fine granularity of IPG-Stretch parameter

Backup



Adapted Data-rate

Data-rate control based on Clause 4 in IEEE802.3ae



$$\text{Adapted Data-rate} = \text{MAC-rate} \times \frac{ifsStretchRatio}{ifsStretchRatio + 8}$$

e.g.
For WAN-PHY operation

$$\text{Adapted Data-rate} = 10.0 \times \left\{ \frac{104}{104 + 8} \right\} \\ \sim 9.2857 \text{ [Gb/s]}$$

Data-rate control based on Clause 4 in IEEE802.3ar/D1.3

$$\text{Adapted Data-rate} = \text{MAC-rate} \times \frac{txFineIpgStretchRatio}{txFineIpgStretchRatio + 256}$$

