

# WHOLESALE ETHERNET CFV 2.0

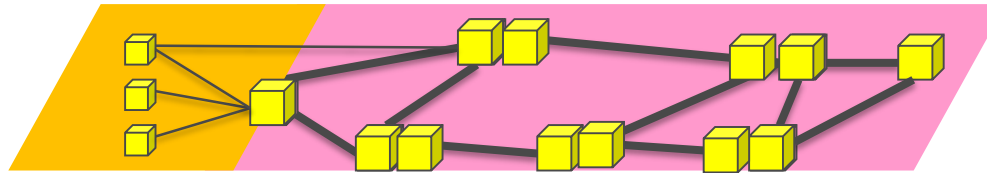
Erläuterungen zur technischen Realisierung  
(QoS und Kategorisierung nach MEF)  
im Rahmen der ÖMV am 24.8.2018



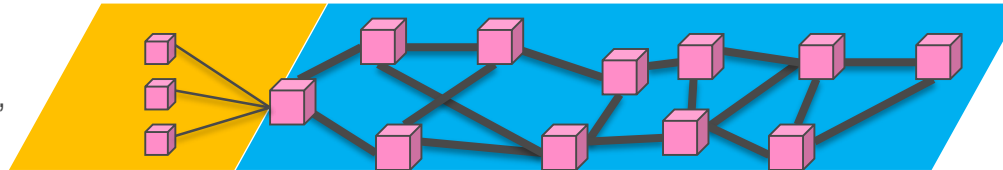
ERLEBEN, WAS VERBINDET.

# LATENZEINFLÜSSE IM OSI-LAYERMODELL

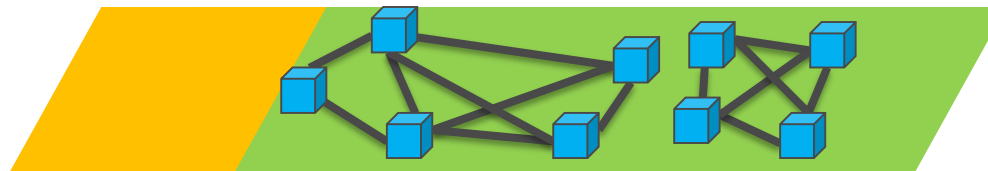
Layer3  
(IP-Layer)



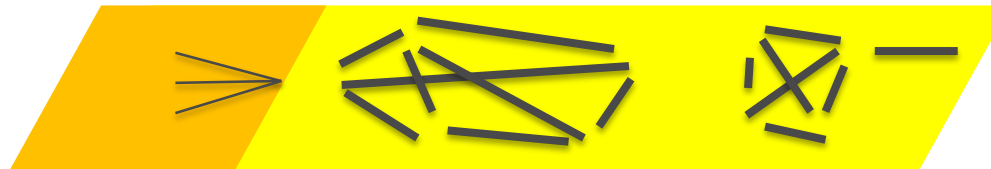
Layer "1/2/3"  
(Transport, Ethernet, MPLS,  
SDH, DSL, ...)



Layer 1  
(Optischer-Layer, WDM)



Layer 0  
(Kabel, Glas, Kupfer)

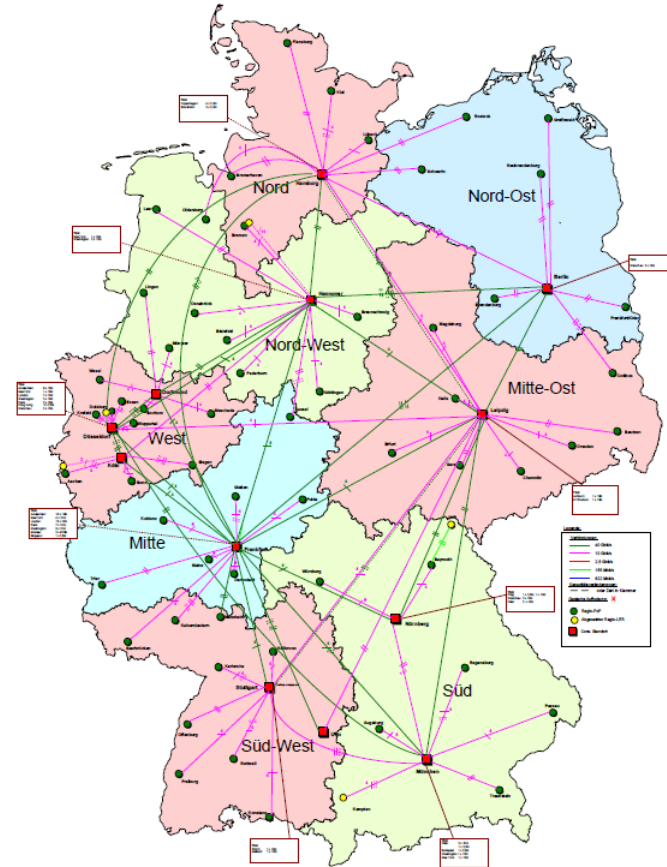
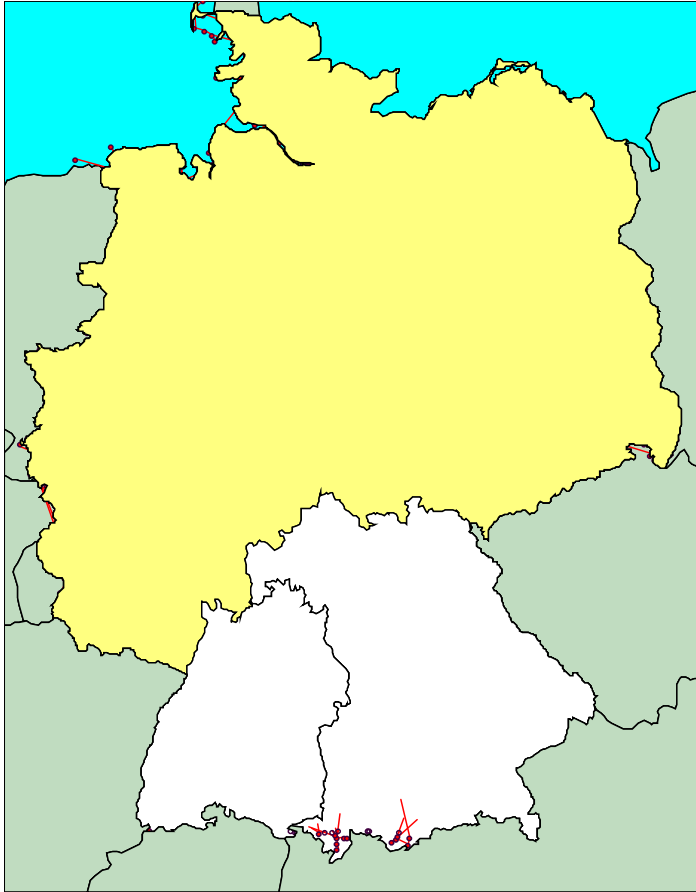


## Latenzeinflüsse:

- Queueing-Latenz
- Protokolloverhead (Verarbeitungszeit)
- Fehlerkorrektur (FEC)
- Protokolloverhead (Verarbeitungszeit)
- Fehlerkorrektur (FEC)
- Fehlerkorrektur (FEC)
- Dispersionskompensation (+25% Latenz)
- phys. Ausbreitung  
1 ms pro 200km

Alle Layer benötigen Zeit, um die notwendigen Protokolle des entsprechenden Layers zu prozessieren, wodurch zusätzliche Laufzeit aufaddiert werden muss.

# UNTERSCHIEDLICHE VERMASCHUNGSGRADE



Höherer Vermaschungsgrad im SDH führte zu kürzeren E2E-Leitungslängen und somit zu eher geringeren Latenzen

# DELAY CFV ETHERNET „ALT“ VS. CFV ETHERNET 2.0

		CFV Ethernet „alt“	CFV Ethernet 2.0
Netzperformance Parameter	Delay (Ethernet Frame Transfer Delay) (differenziert nach Entfernung) (max. Werte vs durchschn. Werte)	Durchschnittlich (90% aller Frames) typischerweise auftretende Werte regionalisiert (mehrere Knotendurchläufe) EFTD bei CFV Ethernet 10M : - bis 50 km: bei 2,5 M 5-11 ms, bei 10 M 4-7 ms - bis 200 km: bei 2,5 M 7-13 ms, bei 10 M 6-9 ms - ab 200 km: bei 2,5 M 12-18 ms, bei 10 M 11-14 ms EFTD bei CFV Ethernet 100M: - bis 50 km : bei 12 M 2-4 ms, bei 100 M 2 ms - bis 200 km: bei 12 M 4-6 ms, bei 100 M 4 ms - ab 200 km: bei 12 M 9-10 ms, bei 100 M 9 ms EFTD bei CFV Ethernet 1G: - bis 50 km: alle Varianten 2 ms - bis 200 km: alle Varianten 4 ms - ab 200 km: alle Varianten 9 ms	Maximale Werte (bundesweit): - 2-20M: $\leq 49$ ms - 2M-20M upgradefähig, 60M-1G: $\leq 21$ ms

Die ursprünglich entfernungsabhängige Differenzierung der Delay-Werte im hochvermaschten SDH-Netz ist wegen der geringeren Vermaschung und nichtvorhersagbarkeit der Routingentscheidungen im Paket-Transportnetzes nicht mehr möglich

# MEF 6.2 SERVICE DEFINITION

<b>Service Type</b>	<b>Port-Based (All to One Bundling)</b>	<b>VLAN-Based (EVC identified by VLAN ID)</b>
<i>E-Line (Point-to-Point EVC)</i>	<i>Ethernet Private Line (EPL)</i>	<i>Ethernet Virtual Private Line (EVPL)</i>
<i>E-LAN (Multipoint-to-Multipoint EVC)</i>	<i>Ethernet Private LAN (EP-LAN)</i>	<i>Ethernet Virtual Private LAN (EVP-LAN)</i>
<i>E-Tree (Rooted-Multipoint EVC)</i>	<i>Ethernet Private Tree (EP-Tree)</i>	<i>Ethernet Virtual Private Tree (EVP-Tree)</i>

**Table 3: Ethernet Services**

Quelle:

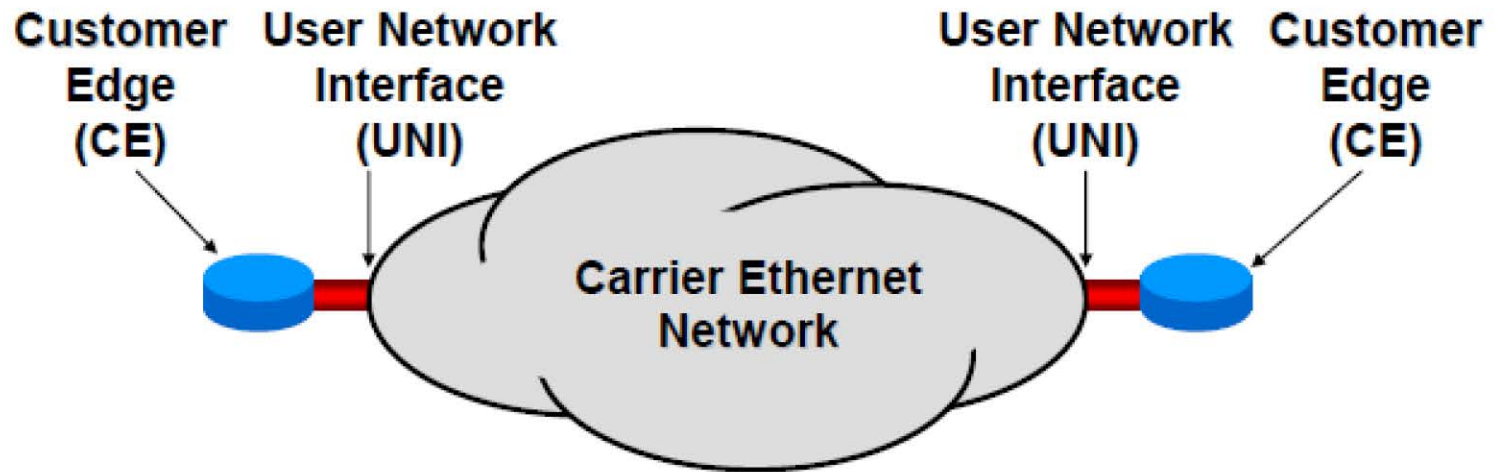
**MEF 6.2** © The Metro Ethernet Forum 2014. Any reproduction of this document, or any portion thereof, shall contain the following statement: "Reproduced with permission of the Metro Ethernet Forum." No user of this document is authorized to modify any of the information contained herein.

Das Produkt CFV Ethernet 2.0 entspricht inhaltlich der port-basierten Service Typ Definition einer E-Line und damit bezogen auf die Ethernet Services einer "Ethernet Private Line (EPL)".



**BACKUP**

# MEF 10.3 ETHERNET SERVICE MODELL



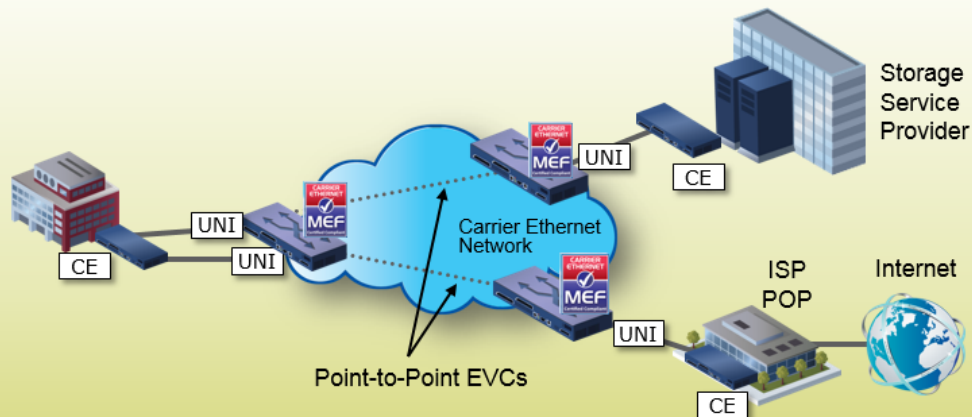
**Figure 1 – Ethernet Services Model**

MEF 10.3 © The MEF Forum 2013. Any reproduction of this document, or any portion thereof, shall contain the following statement: "Reproduced with permission of the MEF Forum." No user of this document is authorized to modify any of the information contained herein.

## Services Using E-Line Service Type

### Ethernet Private Line (EPL)

- Replaces a TDM Private line
- Port-based service with single service (EVC) across dedicated UNIs providing site-to-site connectivity
- Typically delivered over SDH (Ethernet over SDH)
- Most popular Ethernet service due to its simplicity

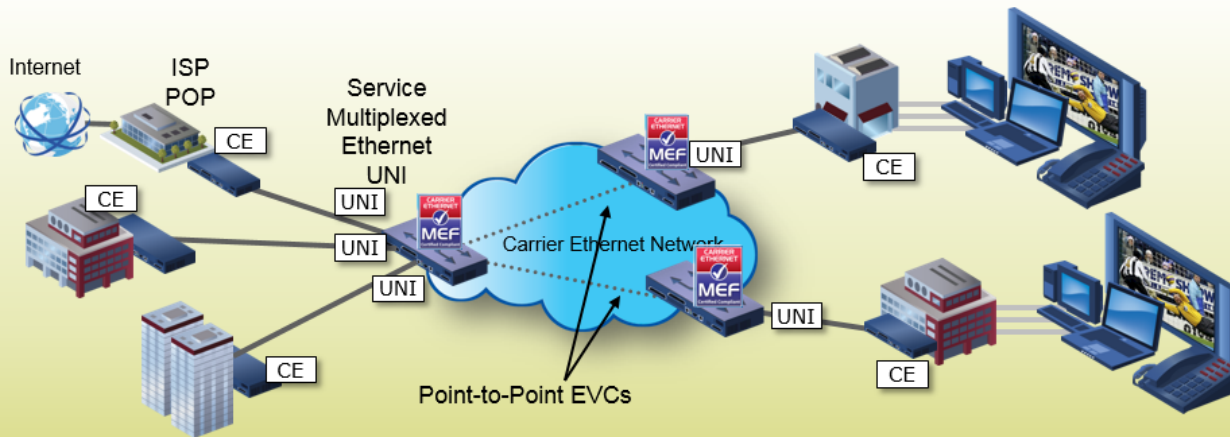




## Services Using E-Line Service Type

### Ethernet Virtual Private Line (EVPL)

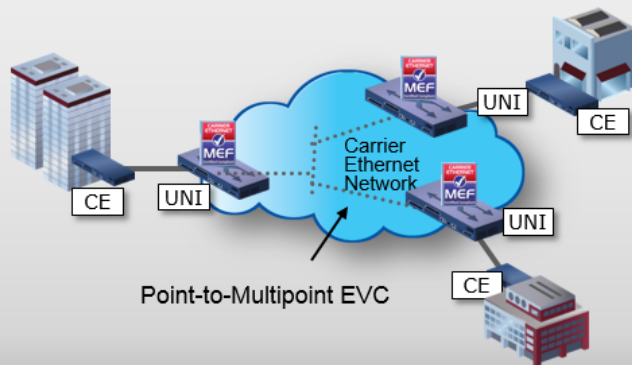
- Replaces Frame Relay or ATM L2 VPN services
  - To deliver higher bandwidth, end-to-end services
- Enables multiple services (EVCs) to be delivered over single physical connection (UNI) to customer premises



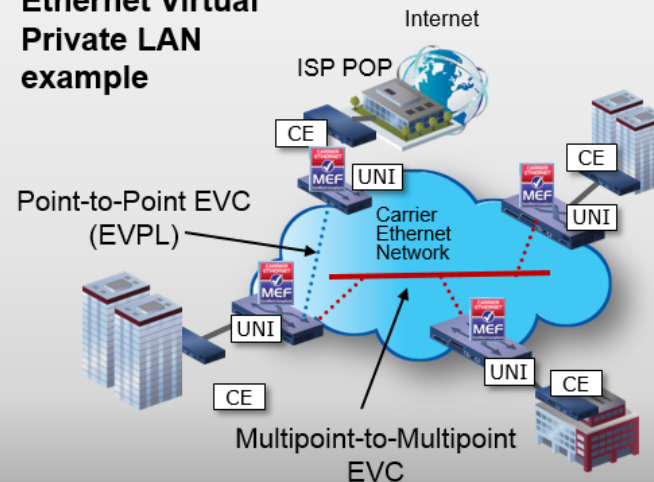
## Services Using E-LAN Service Type

- **EP-LAN:** Each UNI dedicated to the EP-LAN service. Example use is Transparent LAN
- **EVP-LAN:** Service Multiplexing allowed at each UNI. Example use is Internet access and corporate VPN via one UNI

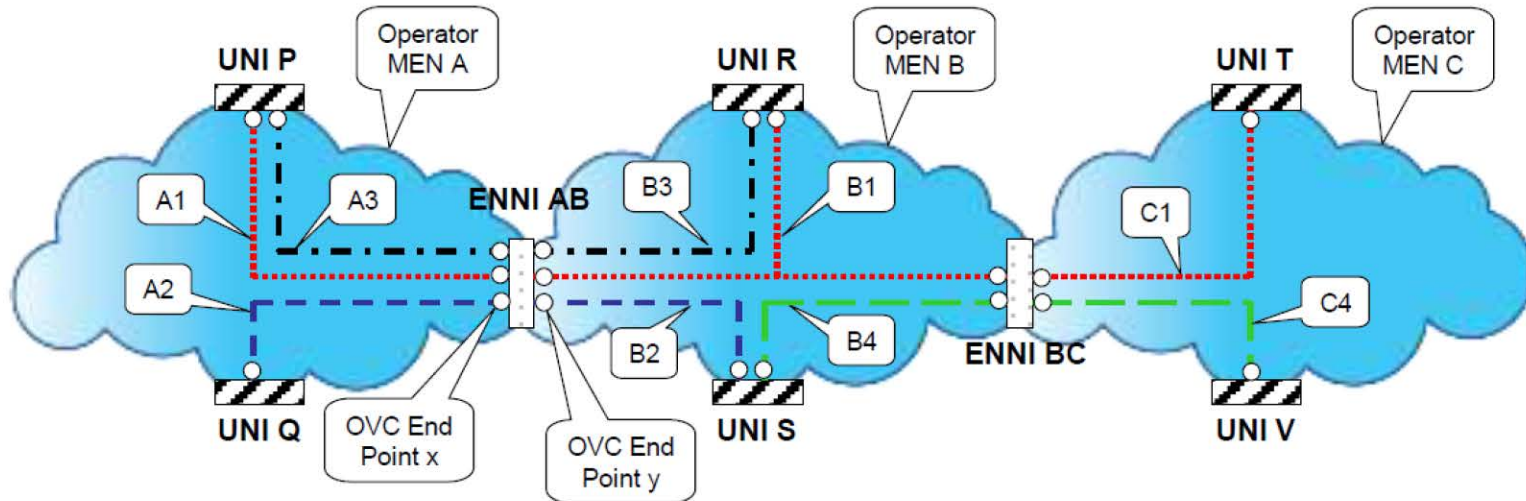
**Ethernet Private LAN example**



**Ethernet Virtual Private LAN example**



# MEF 26.1 E-NNI



EVC	UNIs	OVCs
1 (red)	UNI P, UNI R, UNI T	A1, B1, C1
2 (blue)	UNI Q, UNI S	A2, B2
3 (black)	UNI P, UNI R	A3, B3
4 (green)	UNI S, UNI V	B4, C4

**Figure 4 – Example Relationship of OVCs to EVCs**

# GLOSSAR

- latency - time between data entering a system and leaving it.
- delay - one-way time it takes for signals to leave the sender and arrive at the destination

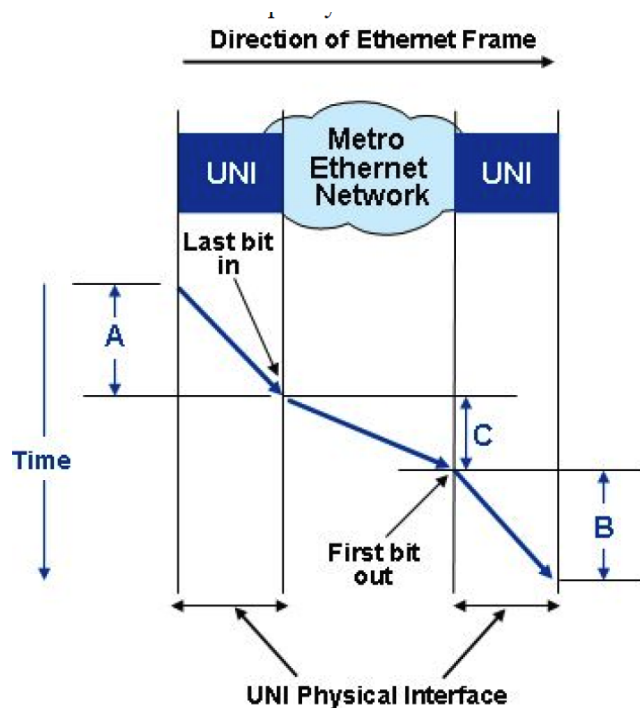


Figure 10: Network Delay Partitioning

© The Metro Ethernet Forum 2003-2006. Any reproduction of this document, or any portion thereof, shall contain the following statement:  
"Reproduced with permission of the Metro Ethernet Forum." No user of this document is authorized to modify any of the information contained herein.