



Transport Consolidation and Resource Control in Triple Play networks

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Agenda

- Building transport networks for the future
 - competitive landscape and solution/service characteristics
- Consolidating the physical infrastructure
- Converging control and service activation infrastructure
- Conclusions



The competitive landscape (i)

- To attract and retain customers, operators must introduce new services
 - At **fast rate**
 - With **large diversity**
 - While **assuring Quality of Experience (QoE)**
- Well known today's examples :
 - VoIP, IP-TV, Flexible Business connectivity services, Fixed – Mobile Convergence



The competitive landscape (ii)

- Cost reduction must be applied
 - **Capital** Expenses
 - Past approach of dedicated networks too expensive for new BW hungry data centric services, especially IP-TV
 - Just over-provisioning does not work
 - **Operational** Expenses
 - Traditional ways of service provisioning too slow and inflexible



Requirements <-> Solution

- Reduce CAPEX
- Reduce OPEX
- Increase rate of new service introduction
- Increase service diversity

Node related	
	<ul style="list-style-type: none"> ▪ Reduce equipment and real-estate cost ▪ Reduce number of nodes and types ▪ Use transport network agnostic to service
Control related	
	<ul style="list-style-type: none"> ▪ Introduce common service activation and monitoring platform



Service Characteristics

Connection type	Services supported	Capacity Mbit/s	Latency ms	Jitter ms
Constant bit-rate	Digital leased lines, analog leased lines	0.1... 2.5	< 10	< 5
<p>(Peer-Peer) Video will drive networks to very high bandwidth with limited jitter. This cannot be provided economically by just introducing more bandwidth.</p>				
data				
Best effort data	Internet access, data VPN	0.01.... 1.0	n.a.	n.a.



Agenda

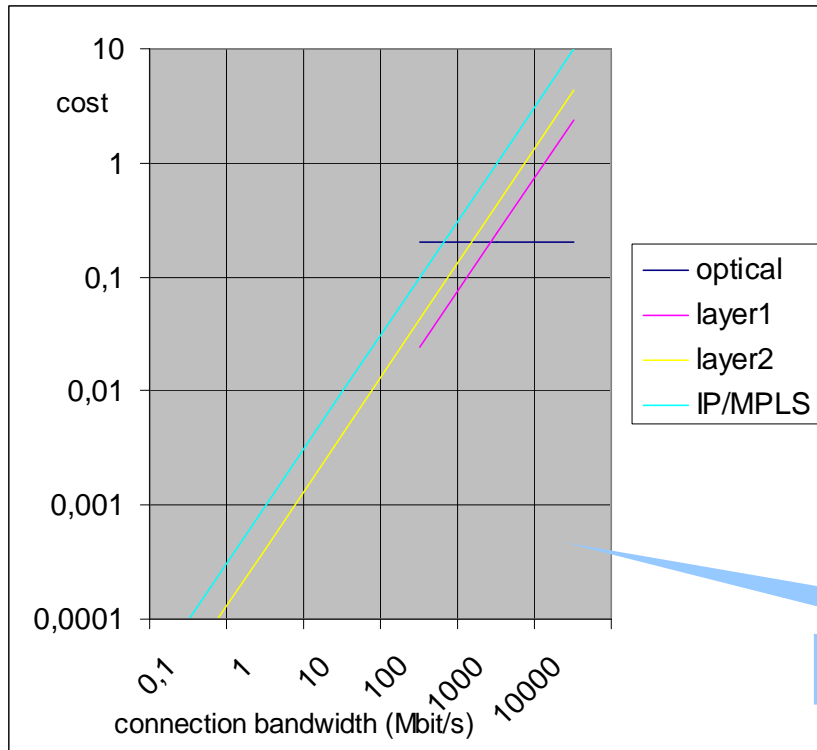
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OSI-layer “characteristics”

Node related

- **Capacity** – the cost of switching is determined by the OSI layer – the lower the OSI layer, the lower the cost per connection.
- **Latency and Jitter** – the per node contribution is lower, the lower the OSI layer at which the traffic is switched.



Switching layer	Latency (typical)
Optical	~ 0 μ s
VC layer 1 (electrical)	5 μ s
Layer 2 high priority	20...40 μ s

Based on typical pricing schemes



Consolidating nodes: benefits

Node
related

- **Flexibility in deployment:** access, aggregation, core
- **Cost optimized** transport of **aggregated traffic** streams
- **Control end-to-end latency and jitter** by switching at appropriate layer
- Simplified spares management and training
- Central Office (real-estate) consolidation



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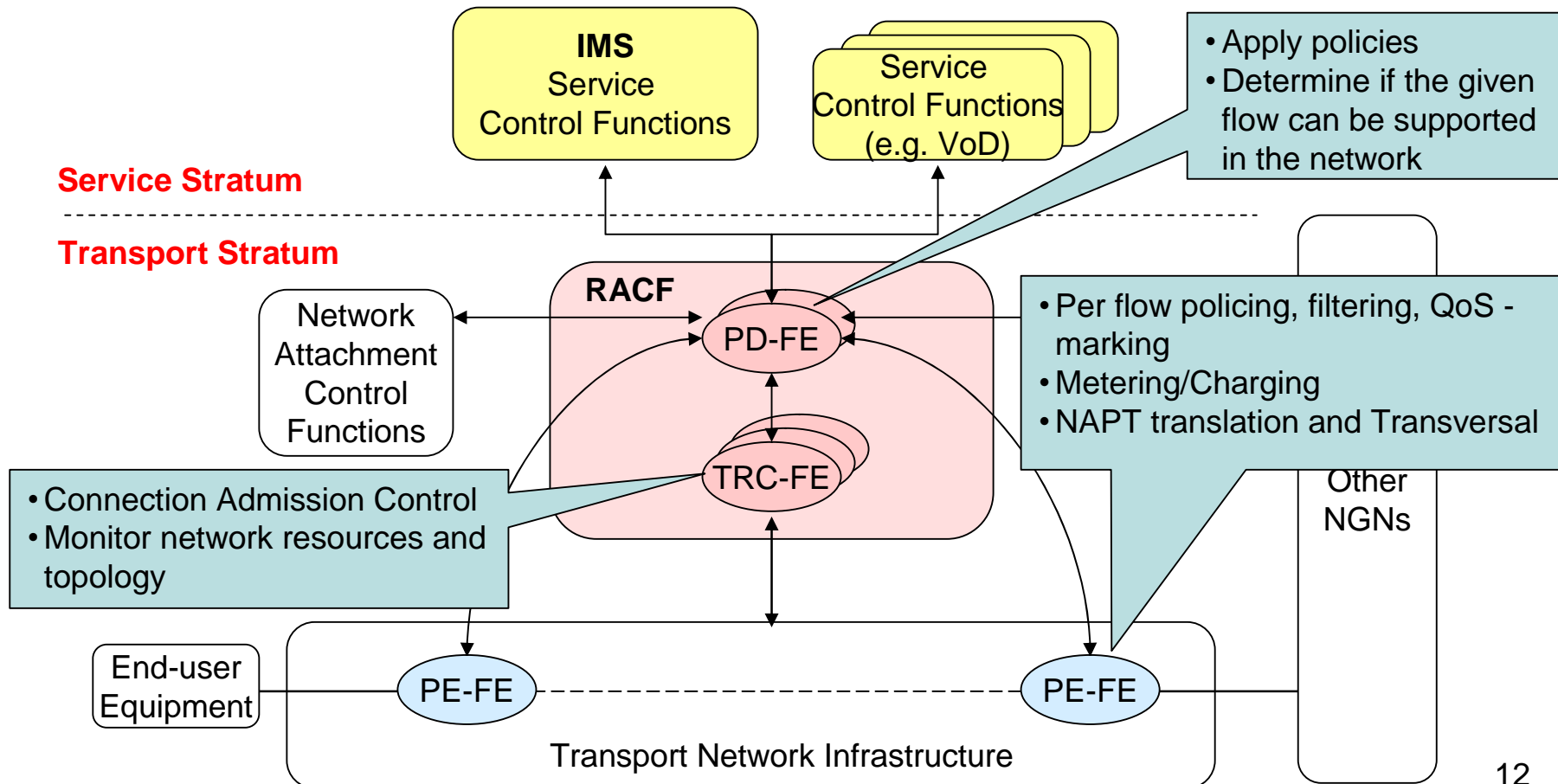
Introducing RACF

Control
related

- 3GPP and 3GPP2 have started development of mobile centric standards for Resource and Admission Control
- ITU-T and ETSI TISPAN are developing more generic solutions
 - ETSI/TISPAN – release 1 focusing on wireline access networks -> RACS
 - ITU-T/FGNGN – including the access as well as core network -> **RACF**

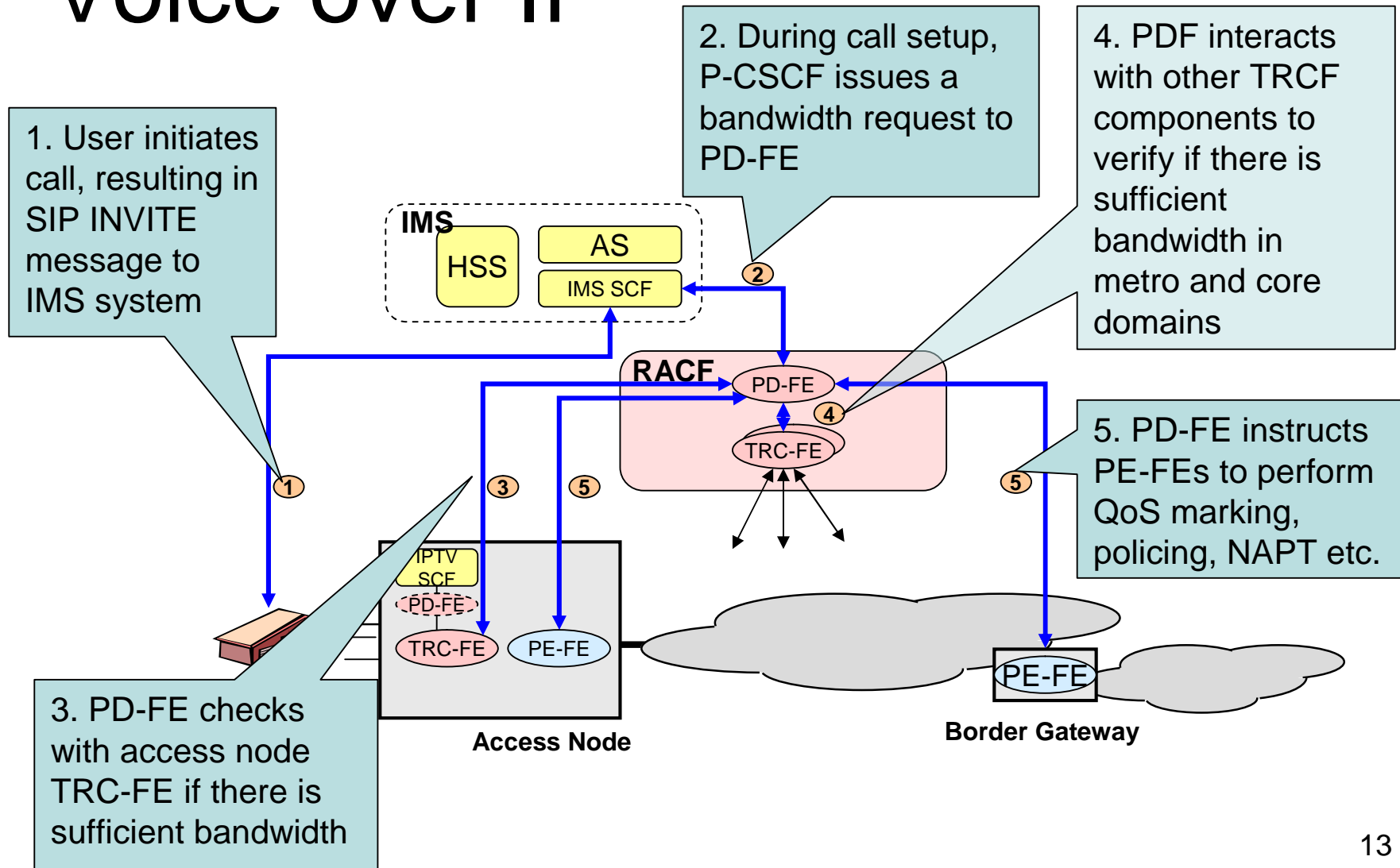


ITU-T RACF Schematics



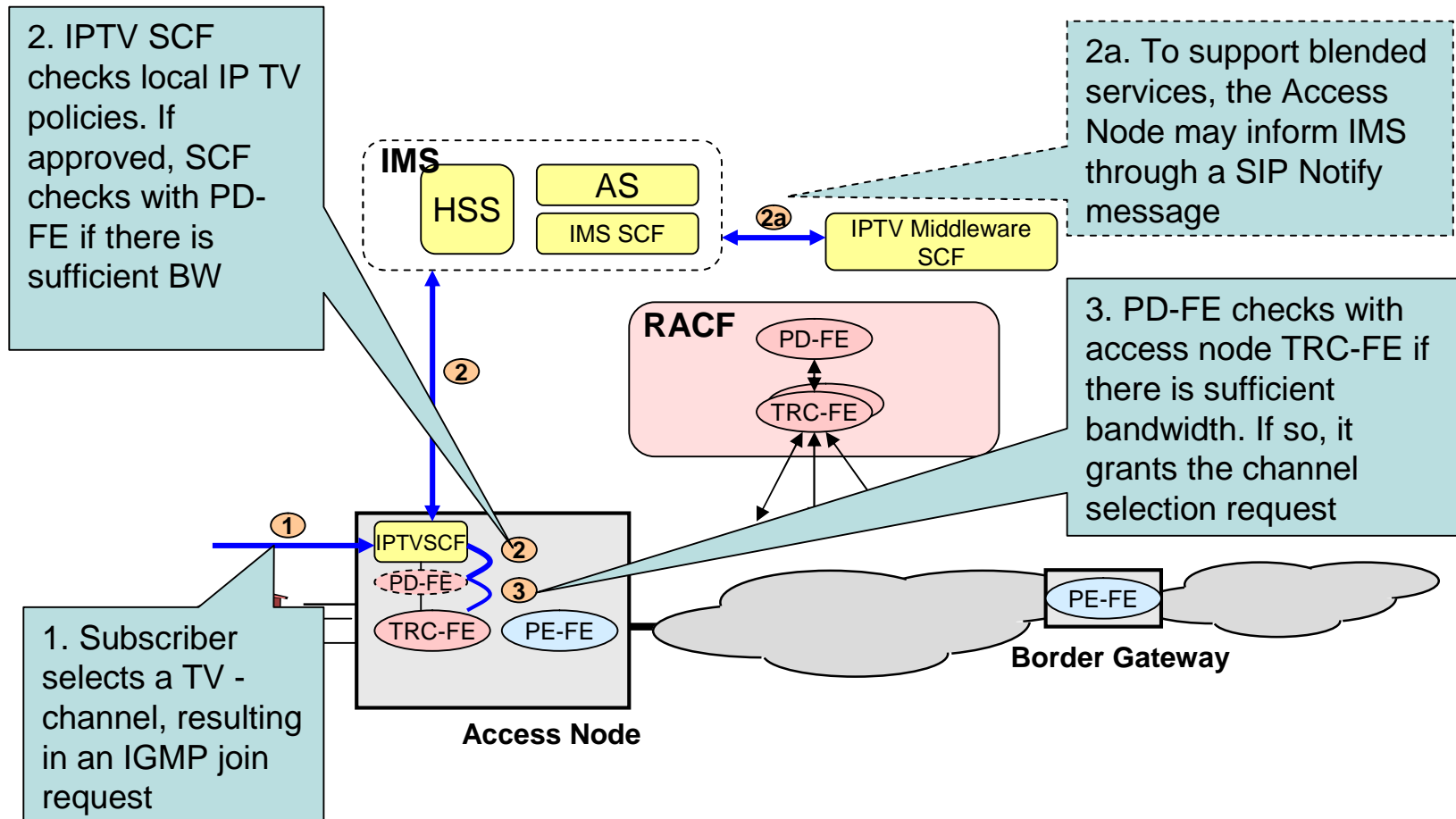


Voice over IP





IPTV application





Conclusions

- Required introduction of new services and video in particular is causing a turnover point where “exploding” BW needs to be controlled and cost effectively transported by
 1. A consolidated Ethernet/optical transport network with fewer network elements, supporting switching at multiple layers
 2. Policy-based bandwidth/QoS control spanning the entire network as supported by the ITU-RACF.