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International Telecommunication Union

Resource and Admission Control for Next Generation Networks

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Outline

- Complexity of NGN QoS
- ITU-T Architecture for NGN Resource and Admission Control
- Configuration example
- Use case
- Summary

Complexity of NGN QoS

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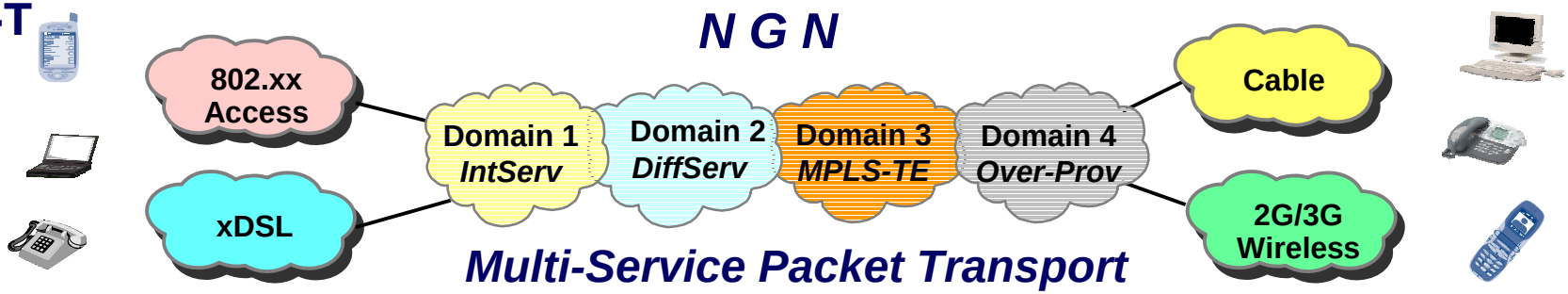

- User-perceived QoS is end-to-end (cf. E.800)
- NGN QoS is complex
  - NGN applications have *diverse* performance needs
  - IP is *not* designed for *consistent* application performance
  - *Diversity* in an end-to-end path is common
    - Different levels of QoS support in *endpoints*
    - Varying types of QoS support in the *transport*
    - Multiple *provider domains*

- ITU-T Q.4/13 is addressing associated issues in its RACF work
- Closely related efforts are under way in ETSI, 3GPPs, IETF, ATIS, etc.

Schematic View of ITU-T NGN Framework Architecture

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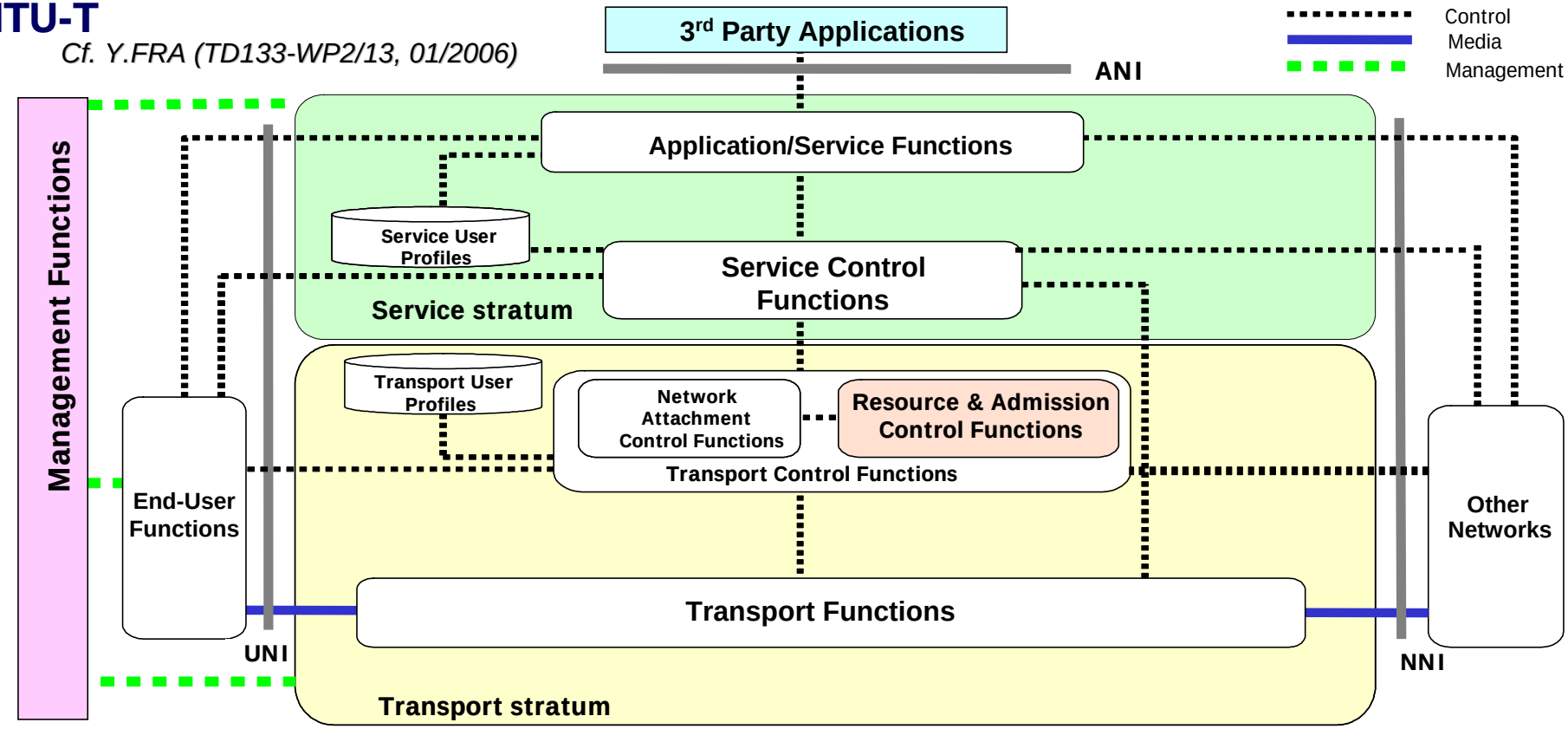
Cf. Y.FRA (TD133-WP2/13, 01/2006)



Resource and Admission Control Functions (RACF)

- Preserve the separation of services and transport
- Bridge services and transport to enable *dynamic application-driven* support for ***performance assurance*** and ***network border control***

ITU-T RACF Architecture

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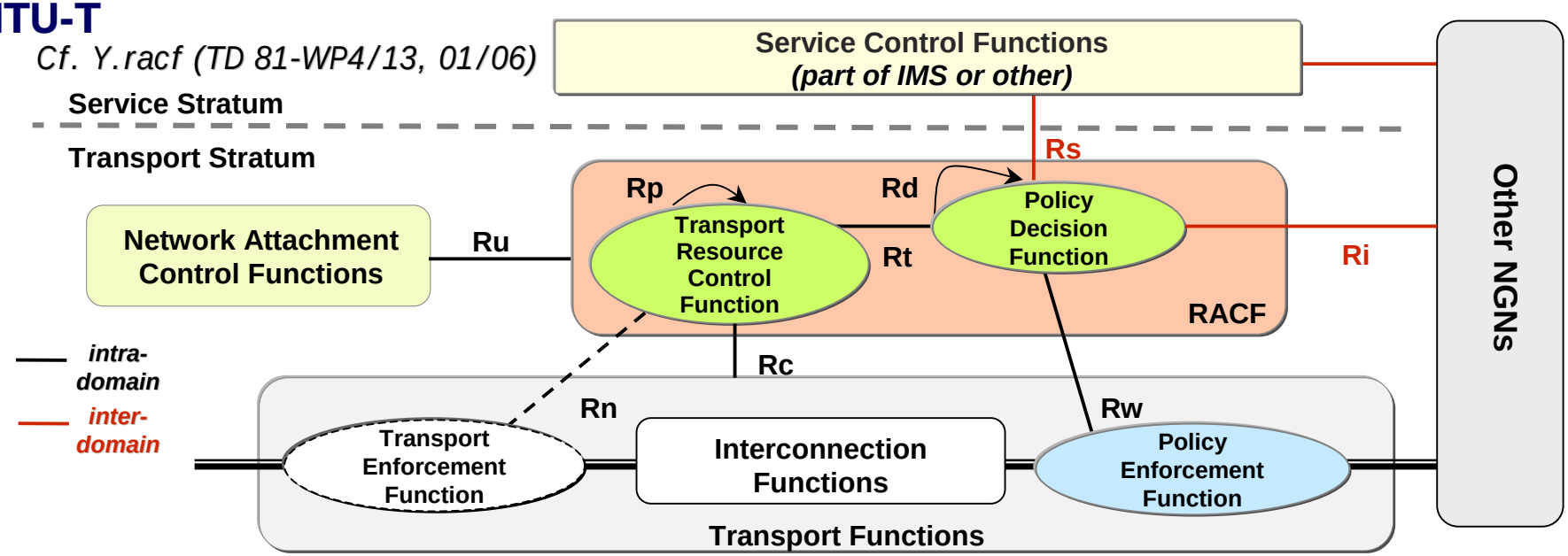
Cf. Y.racf (TD 81-WP4/13, 01/06)



- Policy Decision Function
  service facing, transport independent
- Transport Resource Control Function
  service independent, transport dependent, network-segment specific
- Policy Enforcement Function
  typically part of border transport elements

RACF

- Augments native transport QoS support
  - ✓ Preempting transport congestion at the *service control layer*
  - ✓ Protecting ongoing premium traffic
- Is applicable to all network-controlled applications (VoIP, IPTV, etc.)

Key Roles of RACF and Related Entities

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Policy Decision Function

- Makes the overall admission decision based on policy and resource availability (including path and enforcement point selection)
- Applies resource controls to the transport for bandwidth allocation, packet marking, gating, NAPT, etc.

Transport Resource Control Function

- Tracks transport resource usage and network topology
- Resource-based admission control
- *Applies L2 resource controls to the transport*

Policy Enforcement Function

- Enforces controls applied by PDF

Overall, RACF supports

- *Relative* and *absolute* QoS, including *priority*
- Endpoints of varied QoS control capabilities
- *Push* and *pull* models for policy installation
- Multiple transaction models for resource requests
- Various resource management methods based on *accounting*, *measurement* and *reservation*
- *Existing* and *emerging* transport QoS mechanisms

A Configuration Example

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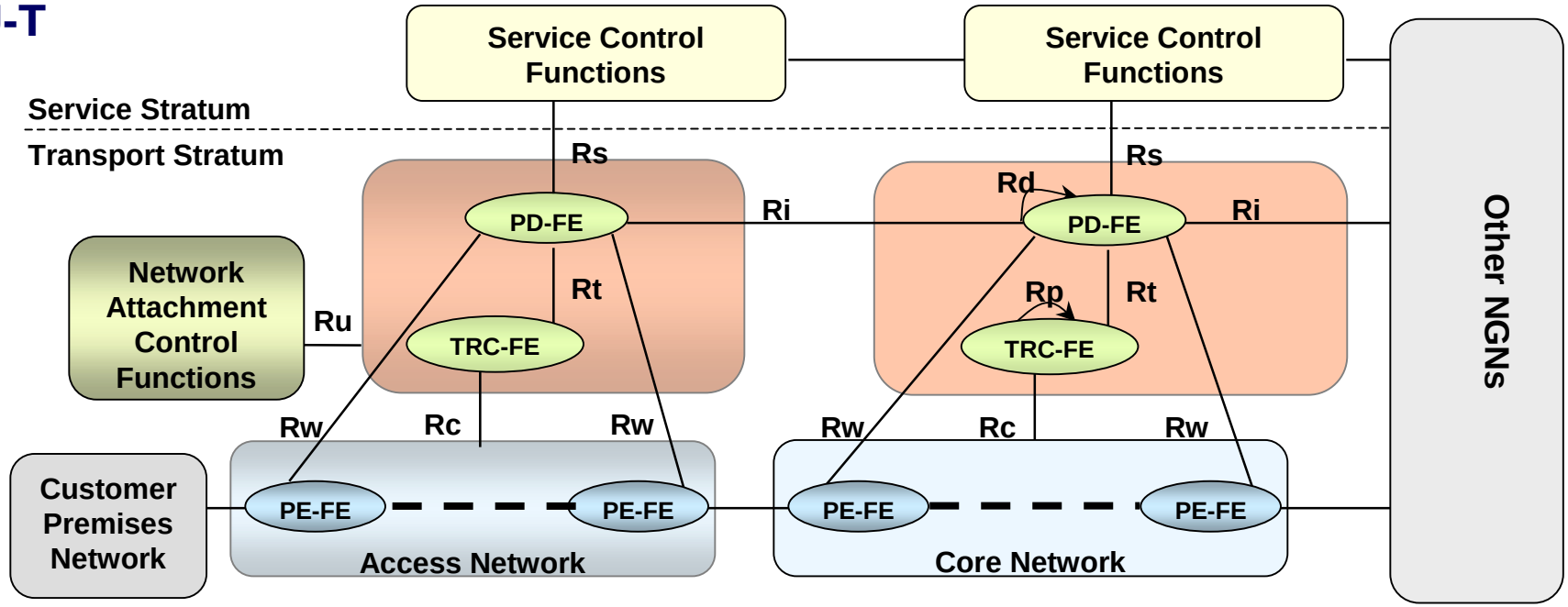
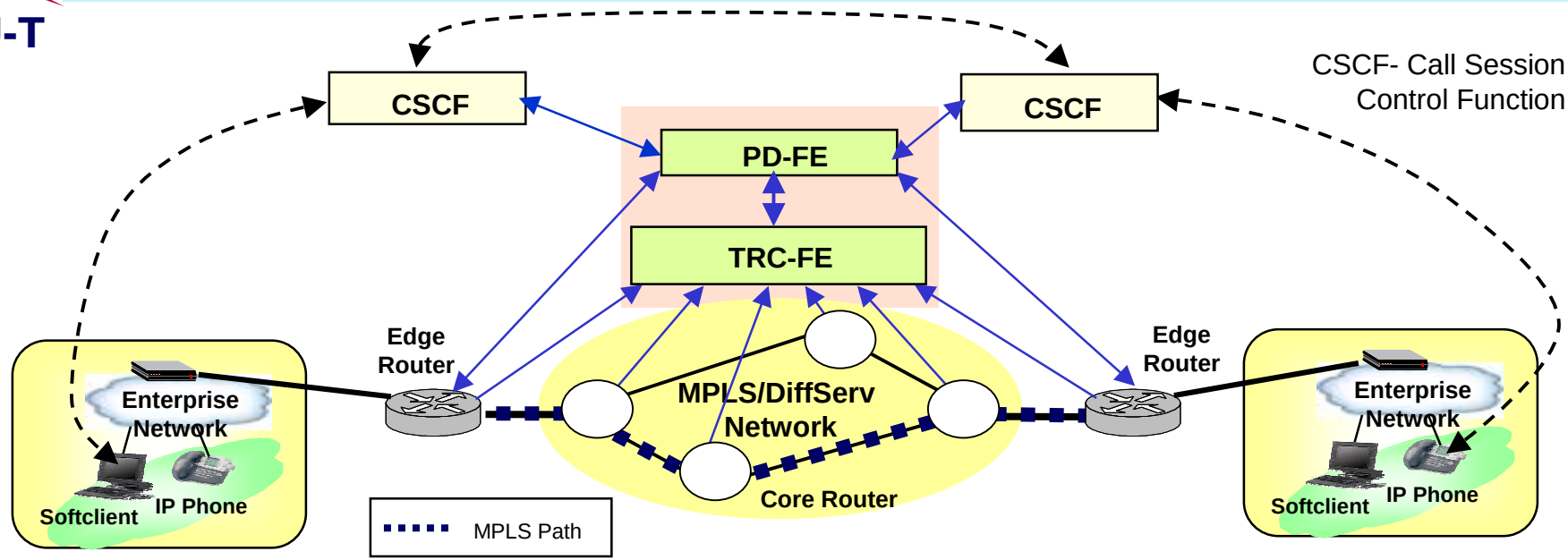


The PE-FE can reside in the

- Gateway GPRS Support Node
- Packet Data Serving Node
- Session Border Controller
- Cable Modem Termination System
- Access Node
- Border Gateway

RACF enables incrementally-deployable end-to-end QoS solutions through per-domain control and inter-domain communication

Use Case: Link-Based Resource Management



- LSPs are set up a priori for routing traffic of a specific application
- DiffServ is used for effecting desired treatment of traffic
- RACF
  - ✓ Measures link utilization per service class periodically
  - ✓ Formulates blocking policy upon link congestion for affected paths
  - ✓ Makes admission decision per policy
  - ✓ Configures edge routers for the admitted traffic

Summary

- Bridging service control and transport, RACF enables dynamic application-driven resource management
  - Application admission decision taking into account resource availability
  - Preempting transport congestion in the service control layer
- Augmenting native transport QoS support, RACF can be applied edge-to-edge or end-to-end and be realized in various ways
- All applications involving network control can make use of RACF for performance assurance and network border control
- The initial Recommendation on RACF (*Y.racf*) is targeted for consent in July
  - Selection and development of RACF protocols is ongoing
  - Next steps are to address open issues such as inter-PDF communication (intra- and inter-provider) and coordination of transactions end-to-end
  - Draft Recommendations *Y.123.qos* and *Y.enet* under development apply RACF to specific Ethernet environments
- Cooperation among related standards efforts across SDOs is desirable in order to achieve a consistent approach

List of Acronyms

- CSCF: Call Session Control Function
- GPRS: General Packet Radio Service
- LSP: Label Switched Path
- NGN: Next Generation Networks
- PD-FE: Policy Decision Functional Entity
- PE-FE: Policy Enforcement Functional Entity
- RACF: Resource and Admission Control Functions
- SDO: Standard Development Organization
- TRC-FE: Transport Resource Control Functional Entity