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

- 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.
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

- **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.)

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

ITU-T Workshop “NGN and its Transport Networks”
Kobe, 20-21 April 2006
Key Roles of RACF and Related Entities

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

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