Resources and Admission Control for NGN

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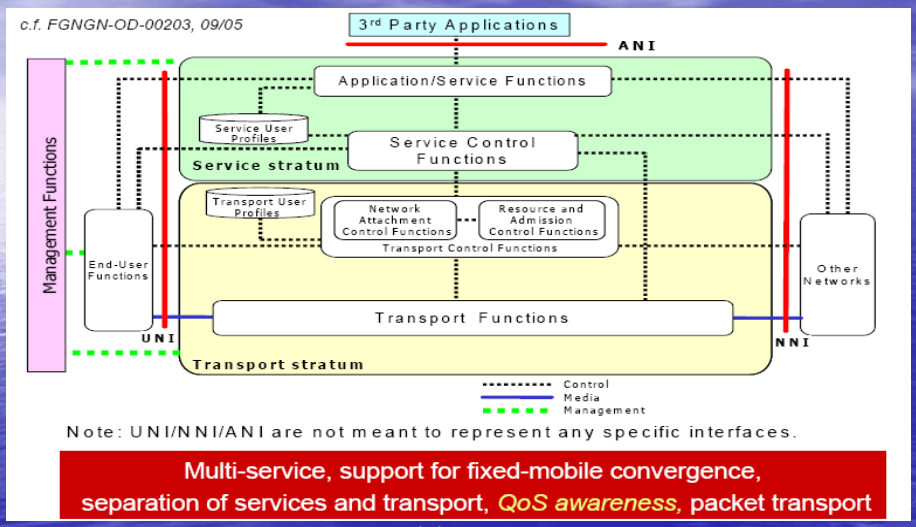
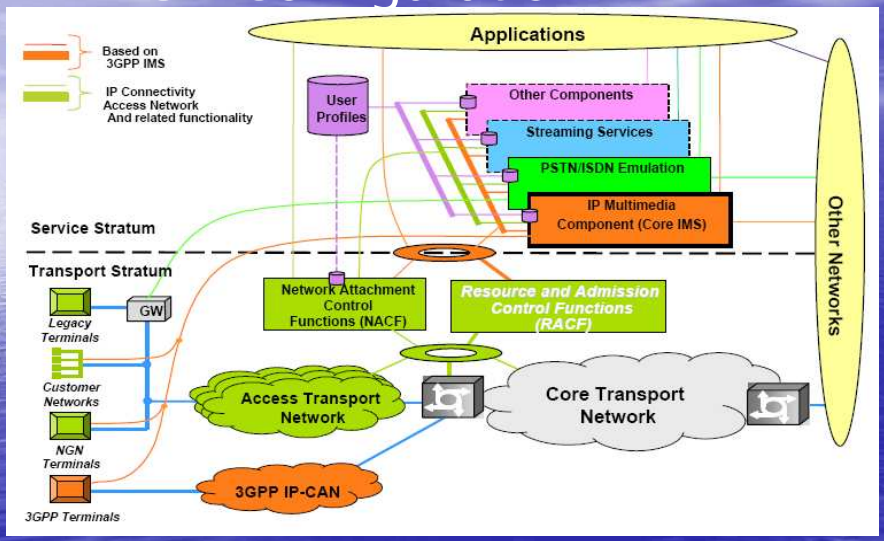
Outline

- ITU-T view of Next Generation Networks (NGN)
- Resource and Admission Control Functions (RACF)
  - Role
  - Architecture
  - Key functional requirements
- Use cases
  - Bandwidth and admission control manager
  - Packet interconnect
- Summary

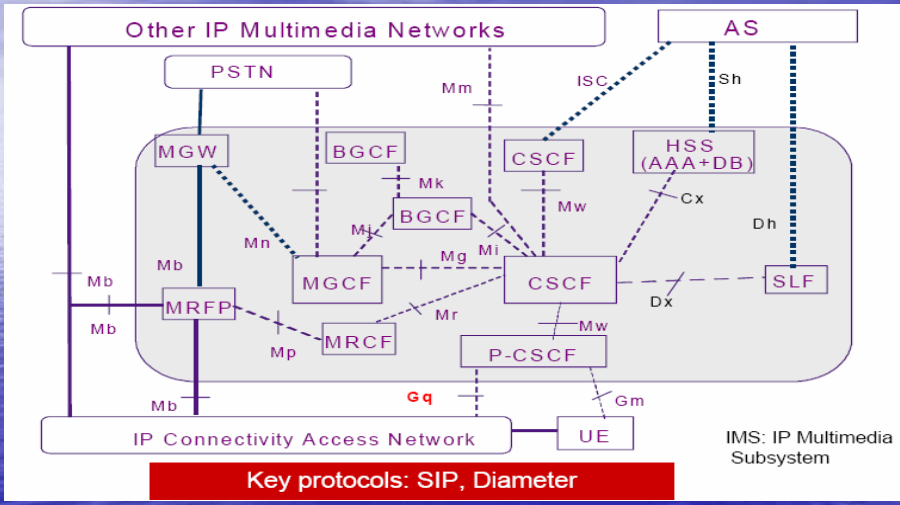
Schematic View of ITU-T NGN Architecture



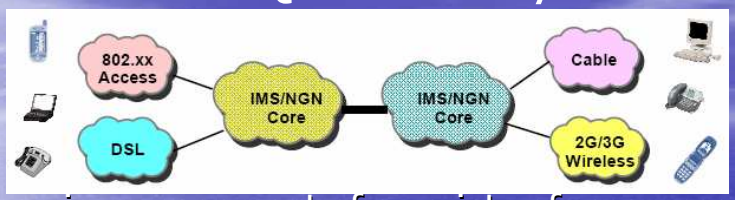
An NGN Configuration



IMS and Its Environment



RACF's Job—QoS and beyond

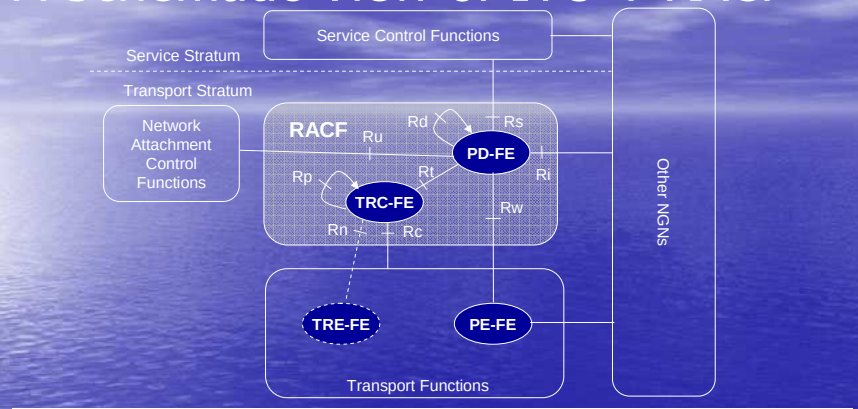


- Dynamic management of a variety of resources (e.g., bandwidth or IP addresses) across varied transport networks—different technologies, administrative domains, ownerships—to achieve end-to-end QoS and border control (e.g., NAPT and packet filtering)
- Service-independent mechanism for transport resource management common to multiple applications (e.g., IMS and multimedia streaming)
  - Admission control for managing network congestion
  - Policy-based arbitration of many-to-many relationship

RACF—Key High-Level Requirements

- Application-driven (network-independent) real-time control
- Management of transport resources within networks (access or core) and at network boundaries
- Policy-based authorization and allocation of resources supporting
  - Relative and absolute QoS
  - End-user equipment of varying QoS control capabilities
  - QoS-unaware, application-QoS-aware, network-QoSaware
  - Push and pull models for policy control
  - Multiple transaction models for resource authorization, reservation and commitment
  - A combination of resource management methods based on accounting, measurement and reservation
- Dynamic control of NAPTs, firewalls and NAT traversal

A Schematic View of ITU-T RACF

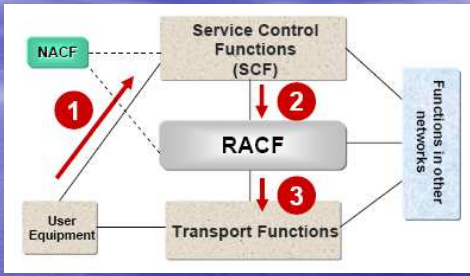


PDF - Policy Decision Function
TRCF - Transport Resource Control Function
BGF - Border Gateway Function
NACF - Network Attachment Control Functions

service-facing, transport technology independent

service-independent, transport-technology dependent, network-segment specific

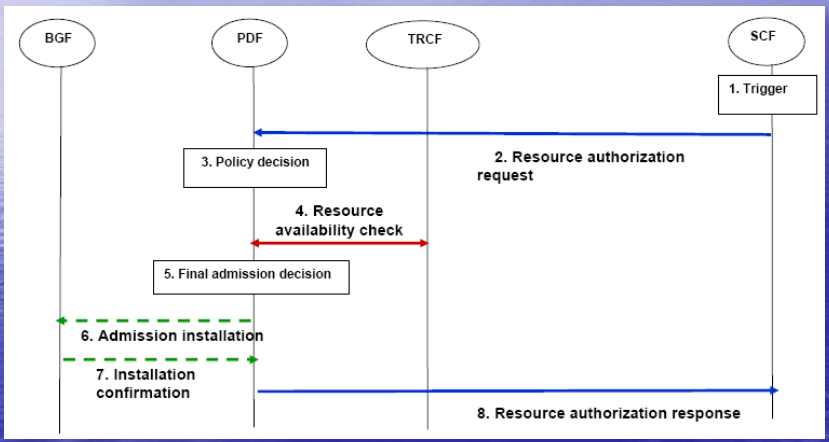
QoS Request Scenario—UE QoS-Unaware, Policy Push



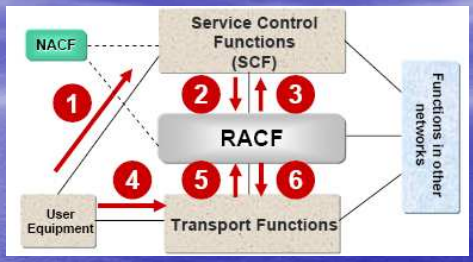
- 1.UE requests a service with no explicit QoS requirements
- 2.SCF requests resource authorization and allocation from RACF based on the user subscription profile
- 3.RACF authorizes resources based on policy rules and resource availability, and applies controls to the transport

Proxied QoS Request Procedure

(Further detail of Step 2 and 3 on the previous slide)



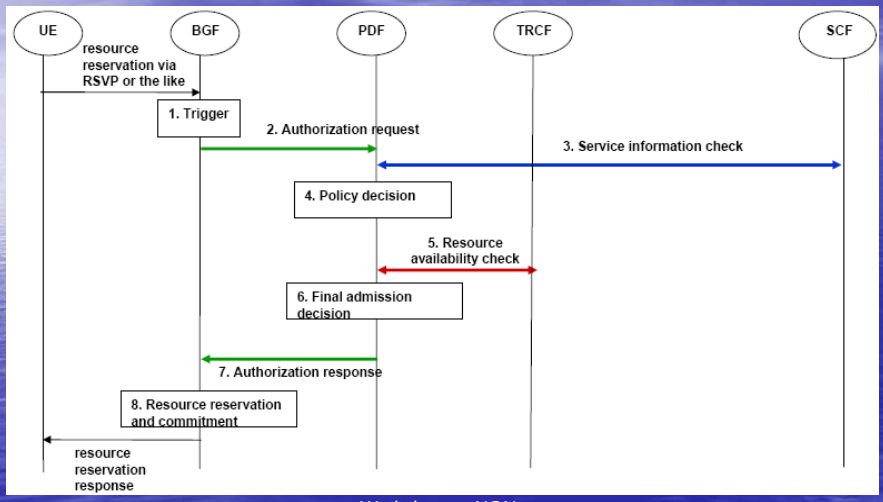
QoS Request Scenario—UE Network-QoS-Aware, Policy Pull



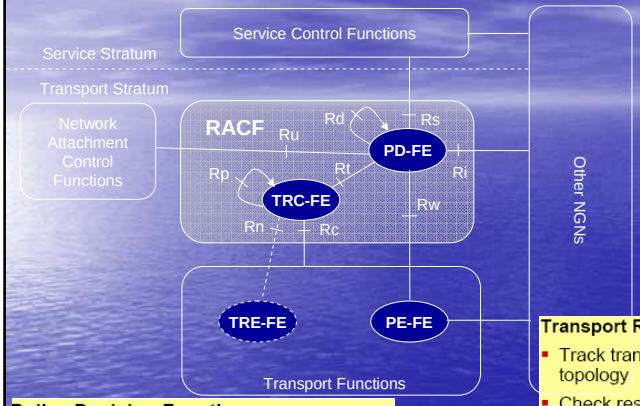
- 1.UE requests a service with QoS requirements
- 2.SCF requests resource authorization from RACF based on the requirements
- 3.RACF authorizes resources based on policy rules and resource availability, and creates an *authorization token,* which is passed to UE via application signalling
- 4.UE reserves resources from the transport (with the token)
- 5.The transport checks with RACF for authorization based on the token
- 6.RACF authorizes resources

UE-Requested Resource Reservation Procedure

(Further detail of Step 4, 5 and 6 on the previous slide)



ITU-T RACF Architecture



Policy Decision Function

- Authorize resources based on policy and resource availability upon SCFs request
- Apply control for opening/closing gate, NAPT, NAT traversal, packet marking etc. to BGF

Transport Resource Control Function

- Track transport resource utilization and network topology
- Check resource availability upon PDF request
- Configure transport resources

Border Gateway Function

- Enforce control per PDF
- Provide congestion/capacity information to TRCF

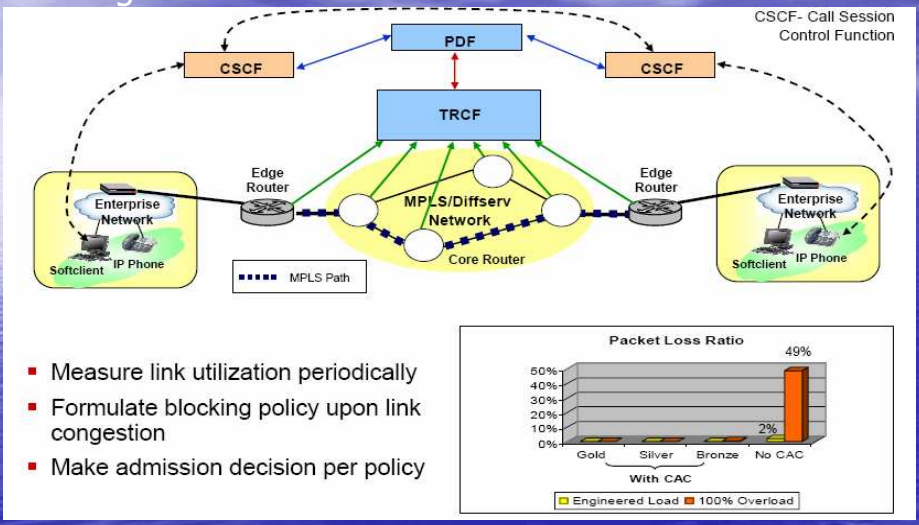
Summary of Resource & Admission Control Functions

Function	Description	Location
QoS/Priority Mapping (Technology Independent)	Maps application QoS and priority to network QoS and other relevant parameters	PDF
Firewall Working Mode Selection	Selects the firewall working mode based on the related service information	PDF
Final Decision Point	Makes decision based on policy and resource availability per service request	PDF
Network Selection	Locates BGFs to enforce decision	PDF
Core Network Path Selection	Selects the technology-independent core network ingress path at the network boundary	PDF
IP Packet Marking Control	Decides on packet marking or remarking	PDF
NAPT & NAT-Traversal Control	Controls network address/port translation and NAT traversal	PDF
IP Gate Control	Controls the opening and closing of IP gates	PDF, A-TRCF
QoS Mapping (Technology Dependent)	Maps network QoS to transport QoS	TRCF
Technology-Dependent Decision Point	Performs resource availability check and selects downstream TRCF, if needed	TRCF
Technology-Dependent Gate Control	Controls the opening and closing of L2 gates	TRCF
Network Topology Maintenance	Collects/maintains the *network topology* information	TRCF
Network Resource Management	Collects/maintains the resource status information	TRCF

General Interface Requirements (Rs, Rp, Rw, Rt)

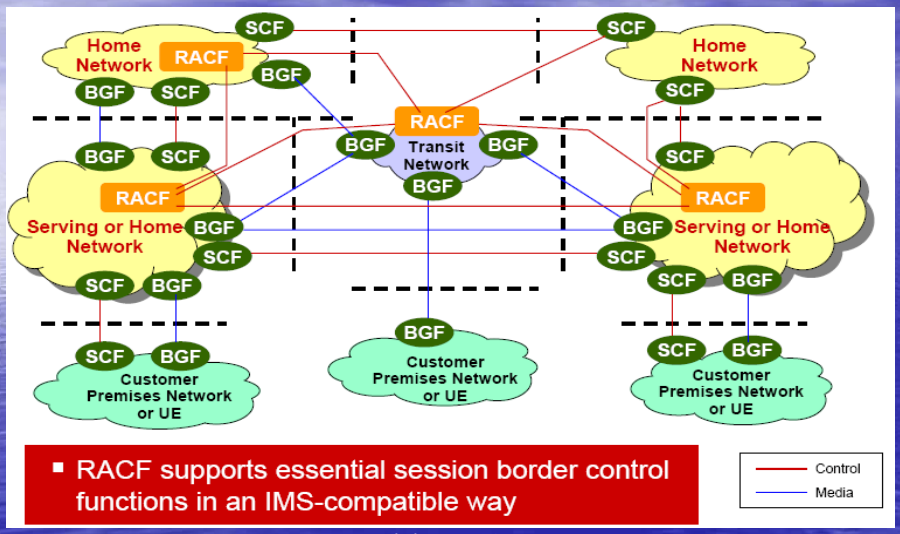
- Request-response transaction
- Notification of asynchronous events
- Reliable delivery of messages
- Mutual authentication of correspondents
- Integrity of information exchanged
- Exchange of a combination of information elements such assess ID, media descriptor, priority, DSCP value, bandwidth committed, bandwidth authorized, authorization token,gate control command, NAPT control command, usage information

Use Case 1: Bandwidth and Admission Control Manager



- Measure link utilization periodically
- Formulate blocking policy upon link congestion
- Make admission decision per policy

Use Case 2: Packet Interconnect



- RACF supports essential session border control functions in an IMS-compatible way

Summary

- Bridging service control and transport, RACF provides for application-driven real-time resource management
- With RACF, the admission decision for a service request can take into account resource availability as dictated by end-to-end performance requirements
- Any services involving network-based service control can make use of RACF to provide for QoS and border control
- ITU-T is addressing the remaining issues for RACF, including
  - Inter-RACF communication (inter-PDF and inter-TRCF)
  - Coordination of transactions end-to-end