

# The Role of MPLS in the Next-Generation IMS Architecture



**Presented by: Douglas Hunt**  
Director, Chief Technology Office  
[HuntDh@lucent.com](mailto:HuntDh@lucent.com)

**Authored by: Peter Busschbach**  
Director, Chief Technology Office  
[busschbach@lucent.com](mailto:busschbach@lucent.com)



## Content

IMS

Resource Management  
RACF, MPLS and PCE



## Market Trends - Seamless Communications!

- Users want access to their communications & entertainment services from many places...
  - Home, office, on-the-go
- ...using several different devices...
  - PC, telephone, mobile phone
- ...without having separate accounts
  - Single sign-on, common contacts, information/content delivery
- New family of intelligent, interactive, location-based broadband services
  - Anytime, anywhere access to messages, lists, calendars and conferencing
  - Live video to handheld devices
  - Mobile access to speech-enabled web services



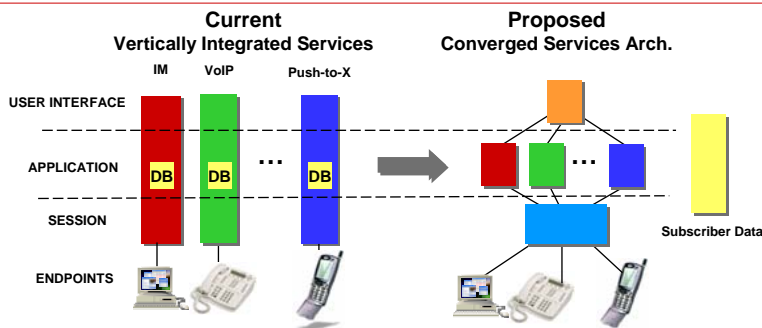
**With seamless blending across wireline and wireless, a service provider can gain larger share of the “telecom wallet”**

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## How Can We Build “Service Enabled” Networks to Support Sophisticated Service Interworking?



### Service Architecture Requirements

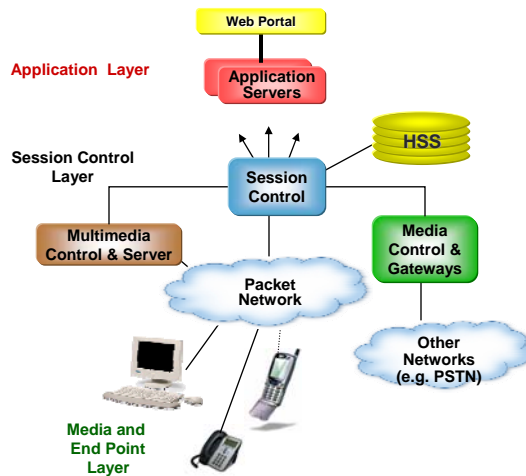
- Common User Interface for all services for an end-customer
- Open application server interfaces to allow a rich set of applications
- Separate subscriber data for a consistent, maintainable subscriber data
- Common session control to support service interworking
- Support for “mobility”
- Support of the full set of access networks and endpoints (POTS, VoIP, ...)

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# IMS – An Industry Standard Service Architecture



## IMS is:

- A VoIP Telephony and Multimedia Services Architecture
- Defined with Open Standard Interfaces -> 3GPP and 3GPP2
- Based on IETF Protocols (SIP, RTP, ..)
- Designed for Both Wireless and Wireline Networks
- A Solution for Service Transparency
- Capable of Interworking with PSTN and Legacy IN Based Services

HSS – Home Subscriber Server

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## IMS

### Resource Management

### RACF, MPLS and PCE

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# Market Landscape

## Service Providers Need To Increase Revenue For IP Services

### Internet Access Providers (Wireline and Wireless)

- Looking for new revenues to justify investment in higher speed broadband access (beyond 1.5 Mbps) to offer more services at faster speeds over IP
- Some of their own new services such as IPTV, Mobile TV, and VoIP require both higher speed and performance in order to provide better end user experience than the competition's
- Broadband Internet pipes are not providing enough revenue growth
  - Devolving into commodity status
  - Competition pushing low-cost / high-bandwidth
- Competitors are stealing value-added revenue using "best-effort" IP flows over the pipe
  - Examples: "parasitic" VoIP, video telephony, gaming, video streaming, web portals, etc.
- Need to create better end-user experience than free-riding Skype, Ebay, Vonage, etc.

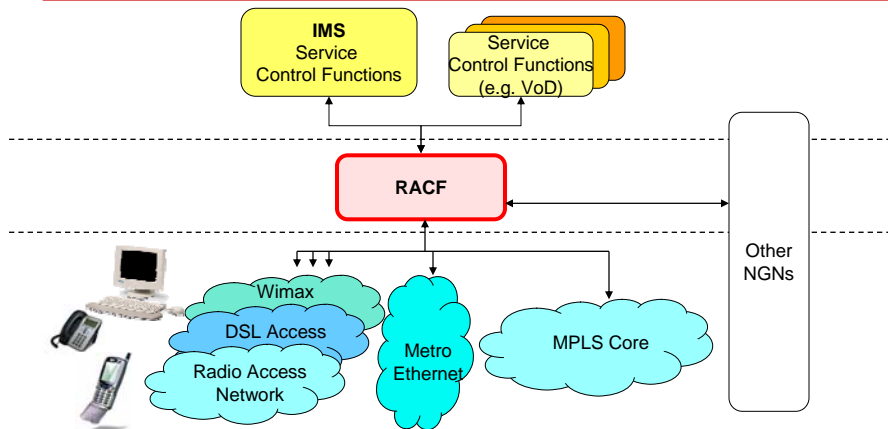
The Resource Management Solution is targeted at Internet Access Providers for their own applications as well as those from the Internet Application Providers

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# Resource and Admission Control Function



ETSI/TISPAN: RACS (Resource and Admission Control Subsystem)

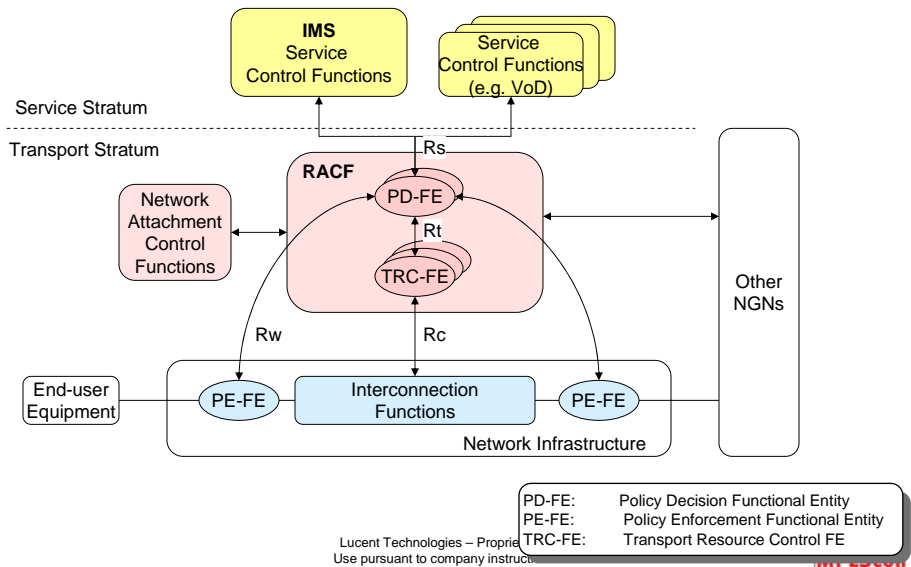
ITU-T: RACF (Resource and Admission Control Function)

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## A Schematic View of ITU-T RACF



## RACF Key Elements

### PD-FE – Policy Decision Functional Entity

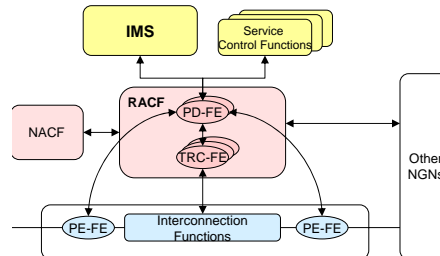
- Apply network policies to resource management requests from Service Control Functions
- Given an IP address pair and required BW, determine if the given flow can be supported in the network
- Manage resources along the flow path including NAPT Transversal and Gate Control

### TRC-FE – Transport Resource Control Functional Entity

- “Connection Admission Control”
- Monitor network resource utilization and network topology to manage path bandwidth availability (reservation and/or monitor)

### PE-FE – Policy Enforcement Functional Entity

- Provides media path functions such as gate control / Firewall
- NAPT translation and Transversal
- Per flow policing and QoS-marking
- Can provide congestion/capacity information to Service Control



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## MPLS and RACF

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MPLS enables sophisticated resource control

- Traffic Engineering
- MPLS support for Differentiated Services

MPLS impacts TRC-FE; not PE-FE

Two options:

- Application session maps to a single LSP
  - E.g. Video-on-Demand
- Multiple sessions are carried over a single LSP
  - E.g. Voice-over-IP

In the case of multiple sessions over one LSP: two-step process:

- Establish LSP through operator-controlled traffic engineering
- Check resources in existing infrastructure for individual sessions
  - If a shortage of resources is imminent, TRC-FE could trigger the operator to allocate more resources.

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## Path Computation Element

Relatively new work item in the IETF

Provides building blocks to enable path computation in large, multi-domain networks.

Drivers:

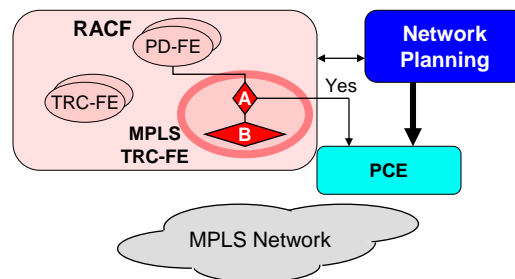
- CPU-intensive path computation
  - E.g. minimum cost point-to-multipoint trees
- Partial visibility
  - E.g. when the LSP crosses domain boundaries
- Limited embedded traffic engineering
  - E.g. use of OSPF instead of OSPF-TE
- ... and others

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## RACF versus PCE



MPLS TRC-FE:

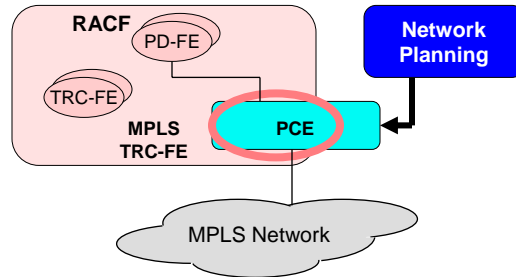
- A. Does the new session require its own LSP?
  - If yes, establish LSP, potentially using PCE for path computation
- B. If not: verify if there is sufficient bandwidth in the LSP(s) allocated for this session type and assign the flow to the appropriate LSP
  - Use PCE for this as well?

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## PCE as part of RACF?



If PCE would be able to do “hierarchical admission control”, it could function as TRC-FE in the RACF Framework

- Note: this is *not* an LSP hierarchy
- PCE would check whether there is sufficient bandwidth to carry an IP flow with specific QoS guarantees through existing LSPs

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## Conclusions

IMS enables seamless communication and blended services

RACF is the glue between IMS – and other services – and the network

PCE is closely linked with the Transport Resource Control function of RACF

Would it make sense to extend PCE to enable complete integration with RACF?

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