



International Telecommunication Union

Functional Architecture Model of NGN

Naotaka MORITA

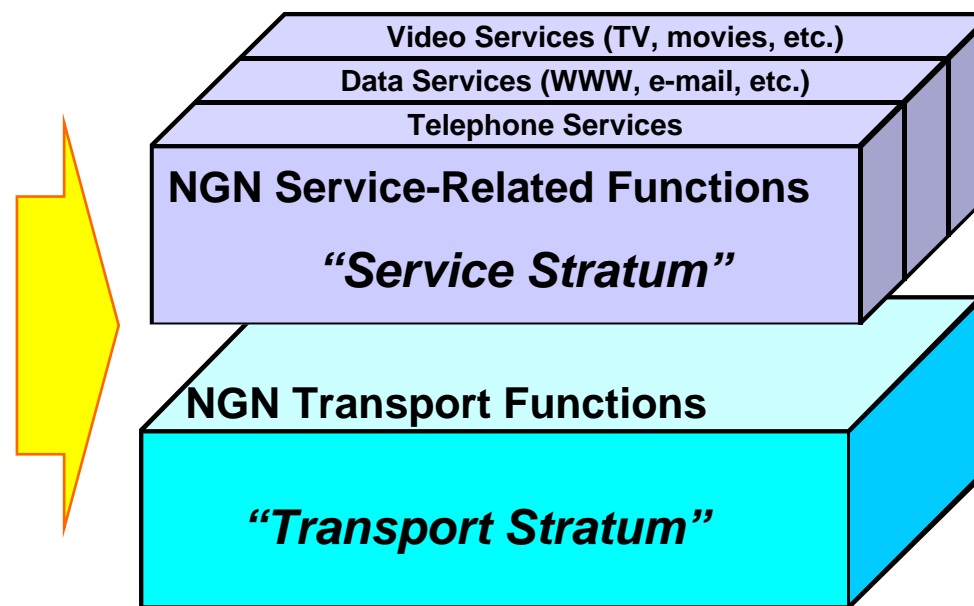
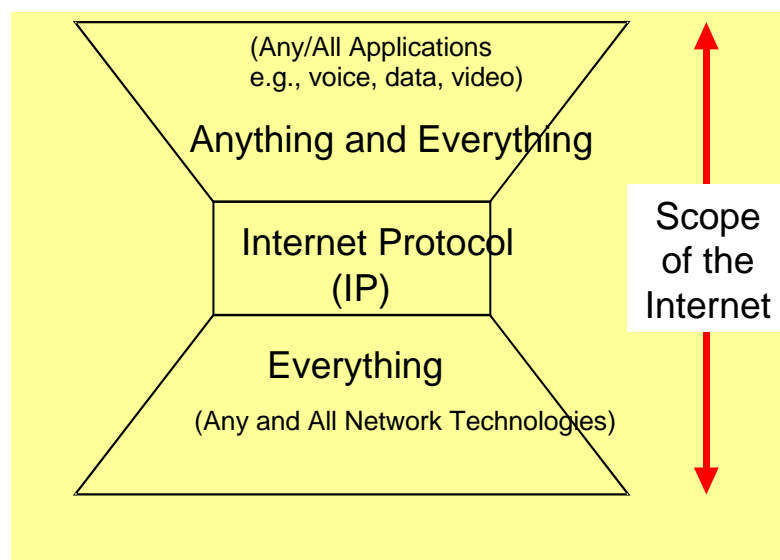
Vice Chairman of SG13, ITU-T
Senior Research Engineer, Supervisor
NTT Service Integration Labs.



Characteristics of Next Generation Networks (Y.2011)

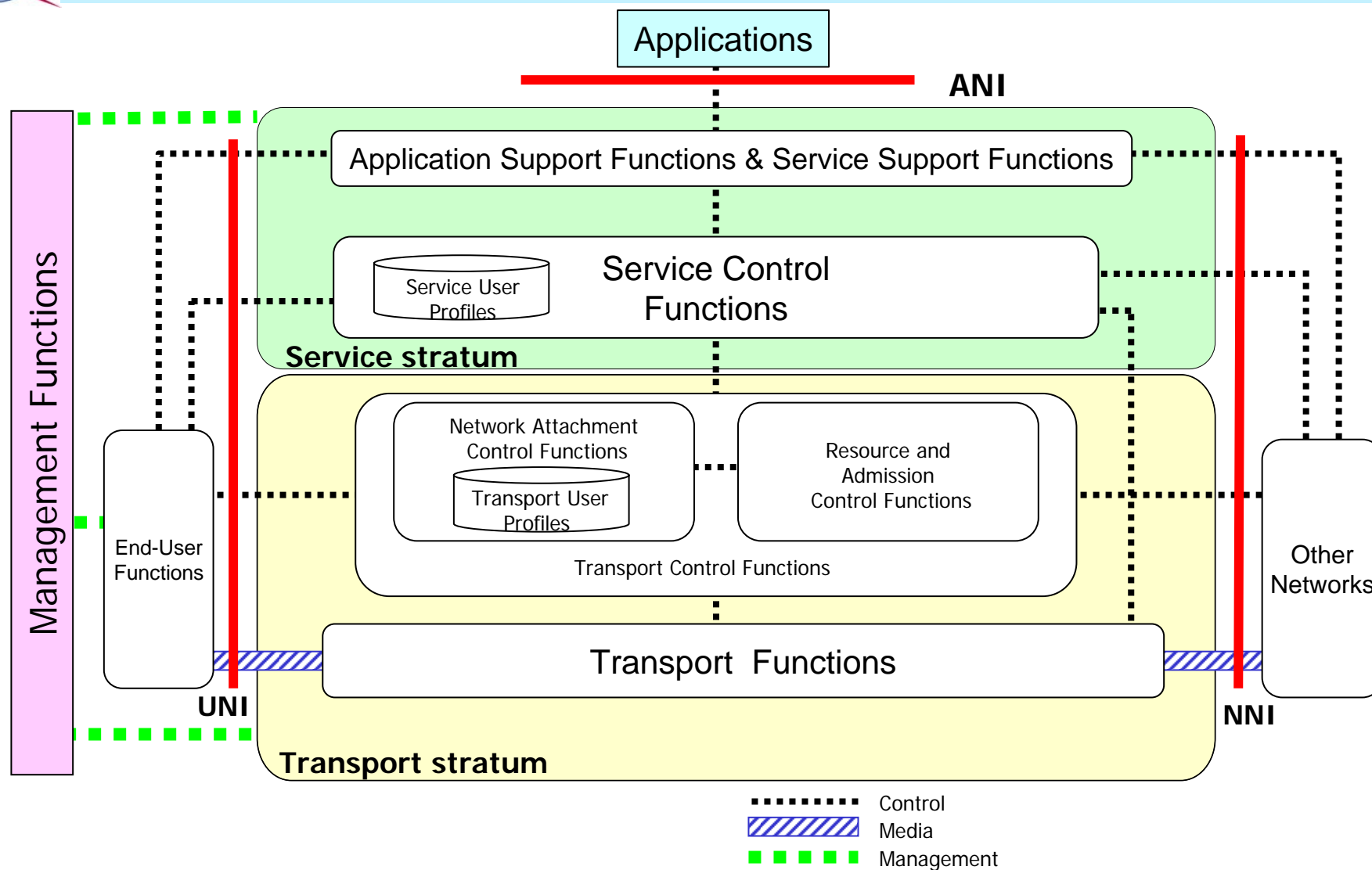
Service-related functions and transport functions are separated into two strata

- Transport functions assume **packet-based integrated networks**
 - The currently widely used **IP protocol** is the core protocol.
- Service-related functions refer to basic and additional telephone connection functions and the provision of functions inherent to services such as WWW and video distribution
 - Initial studies focused on **session control** functions for the implementation of IP telephony, video chat, and video-conferencing using the **SIP protocol** as the core protocol.
- The NGN separation model supports new independently developed technologies and flexible system deployment and permits the formation of various businesses





NGN architecture overview (Rec. Y.2012)

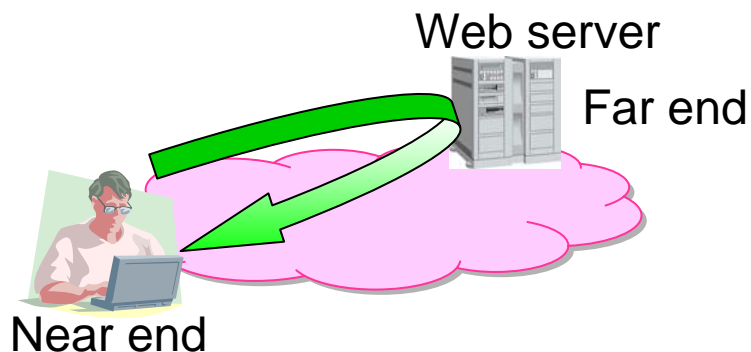


Note: UNI/NNI/ANI are not meant to represent any specific interfaces.

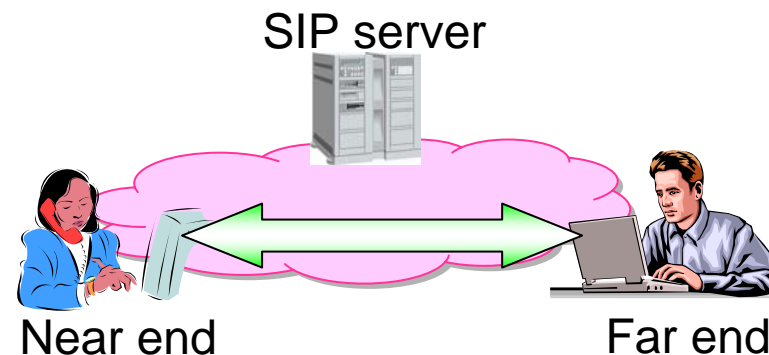


SIP: Unique features of interactive end-to-end communication

Web browsing



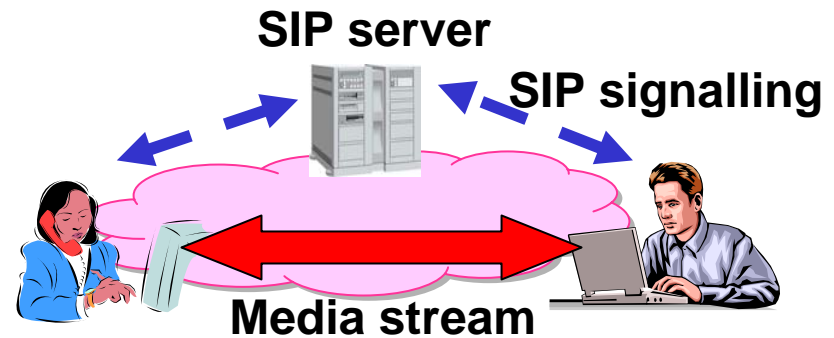
Interactive communication (e.g., IP telephony)



Web browsing	Communication mode	Interactive communication
Machine	Far end example	General public
Fixed and easy to know	Far end IP address	Fluid and hard to know in advance
User always originates communication	Communication initiation	User may be invited to communication
Near end selects from a list provided by far end	Application to be used	Room for negotiation, e.g., codec type
Always available	Far end availability	Uncertain



SIP: Support for end-to-end communication



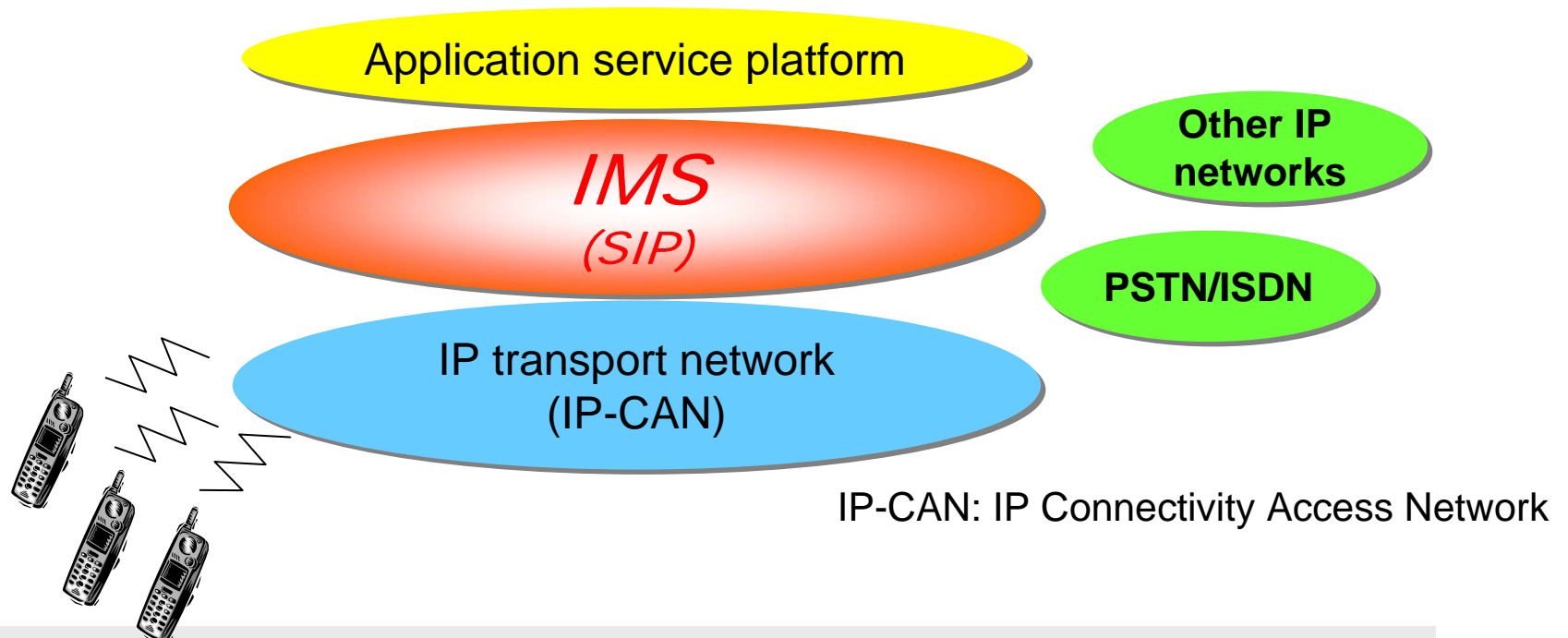
Communication mode	Interactive communication	Functions achieved by session control (SIP)
Far end example	General public	<ul style="list-style-type: none"> ○ Identification with unique user name (URI) ○ Registration to prepare for receiving a session (REGISTER) ○ User authentication to validate the user
Far end IP address	Fluid and hard to know in advance	
Communication initiation	User may be invited to communication	<ul style="list-style-type: none"> ○ Support of session initiation (INVITE) and termination (BYE)
Application to be used	Room for negotiation, e.g., codec	<ul style="list-style-type: none"> ○ Negotiation of communication means (offer and answer by SDP)
Far end availability	Uncertain	<ul style="list-style-type: none"> ○ Proxy on behalf of user, providing alternate method ○ Presence to inform availability in advance ○ Instant messaging



IMS: What is IMS (IP Multimedia Subsystem)?

IMS is a subsystem providing call processing and a variety of multimedia services in an IP-based packet-switching domain.

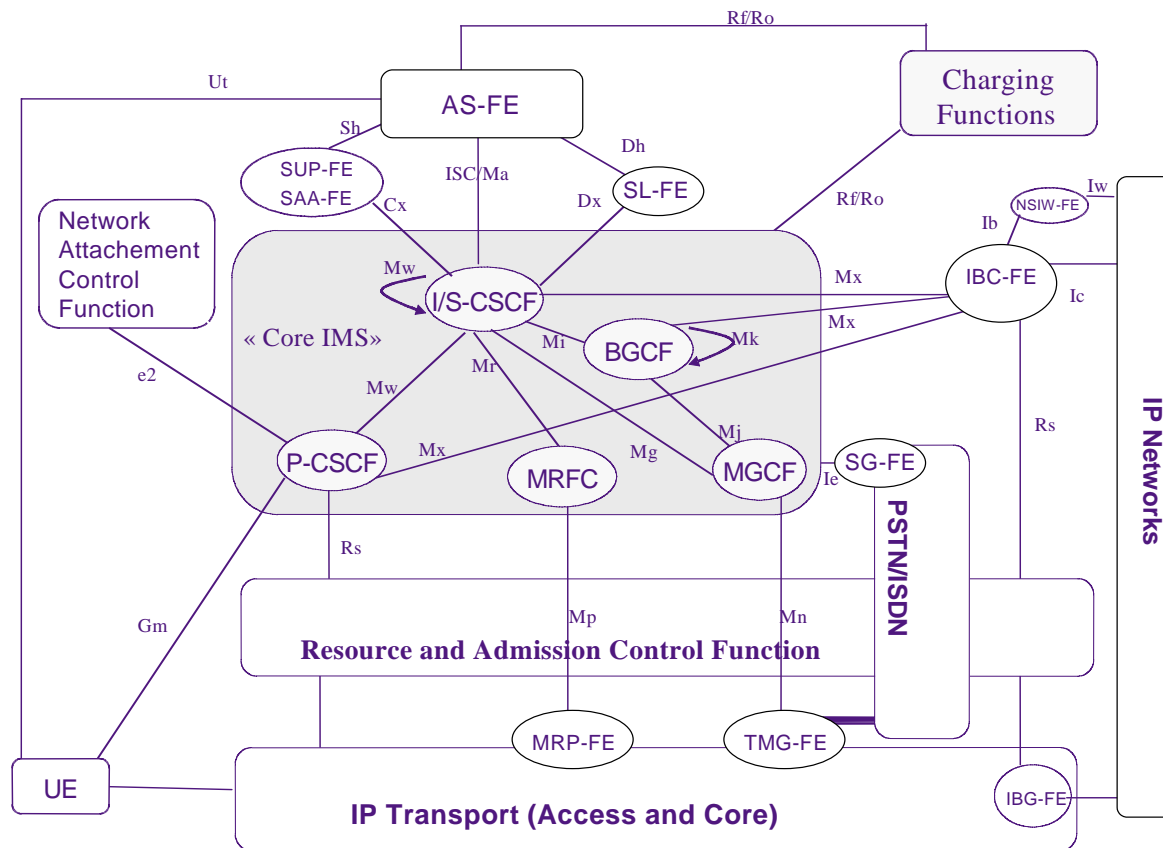
- Provides voice, video, presence, messaging, conferencing, and other services
- **Complies with IETF standardized session control (SIP); profiling**
- Independent of access network
- Application service platform itself is outside the scope of IMS





NGNs Based on IMS (Rec. Y.2021)

- Architecture centers on SIP proxy-equivalent Call Session Control Functions (**CSCFs**).
- Employs a **separation model** that decouples media processing elements and their controlling elements.
- Links to transmission systems through a Gq interface.

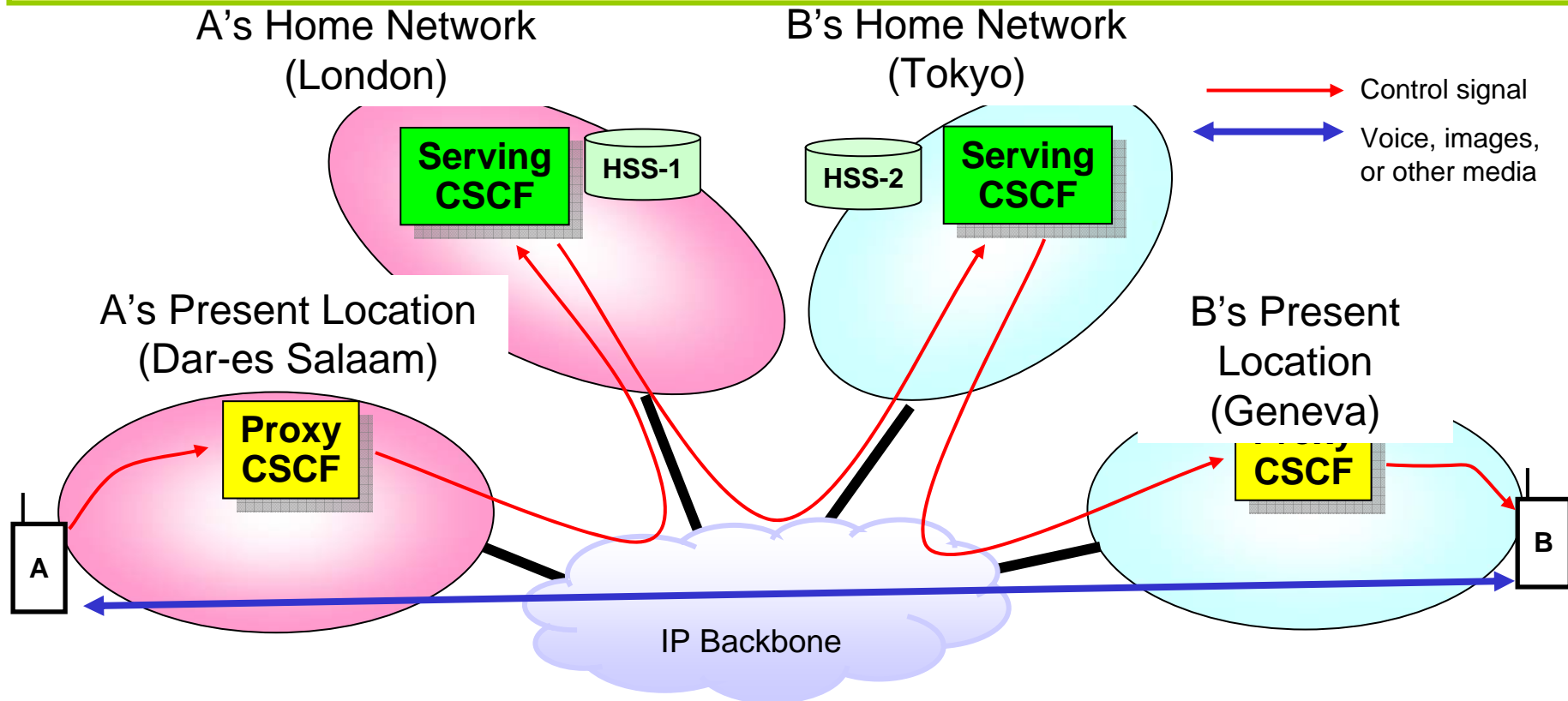


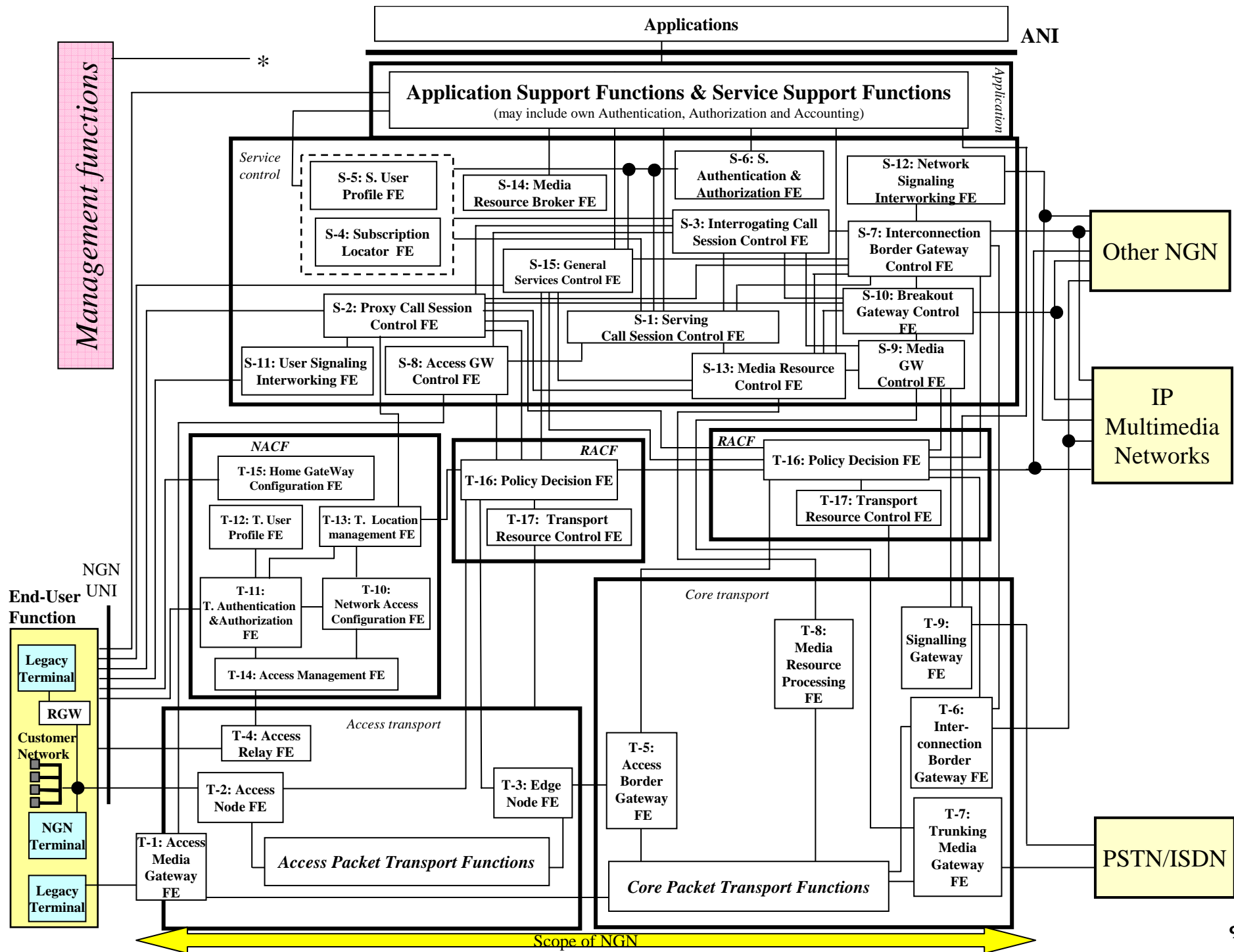
- AS: Application Server
- BGCF: Breakout Gateway Control Function
- CSCF: Serving CSCF
- HSS: Home Subscriber Server
- IP-CAN: IP-Connectivity Access Network
- ISC: IMS Service Control Interface
- MGCF: Media Gateway Control Function
- MGW: Media Gateway
- MRFC: Multimedia Resource Function Controller
- MRFP: Multimedia Resource Function Processor
- P-CSCF: Proxy CSCF
- SLF: Subscription Locator Function



Roaming Implementation with Proxy CSCF

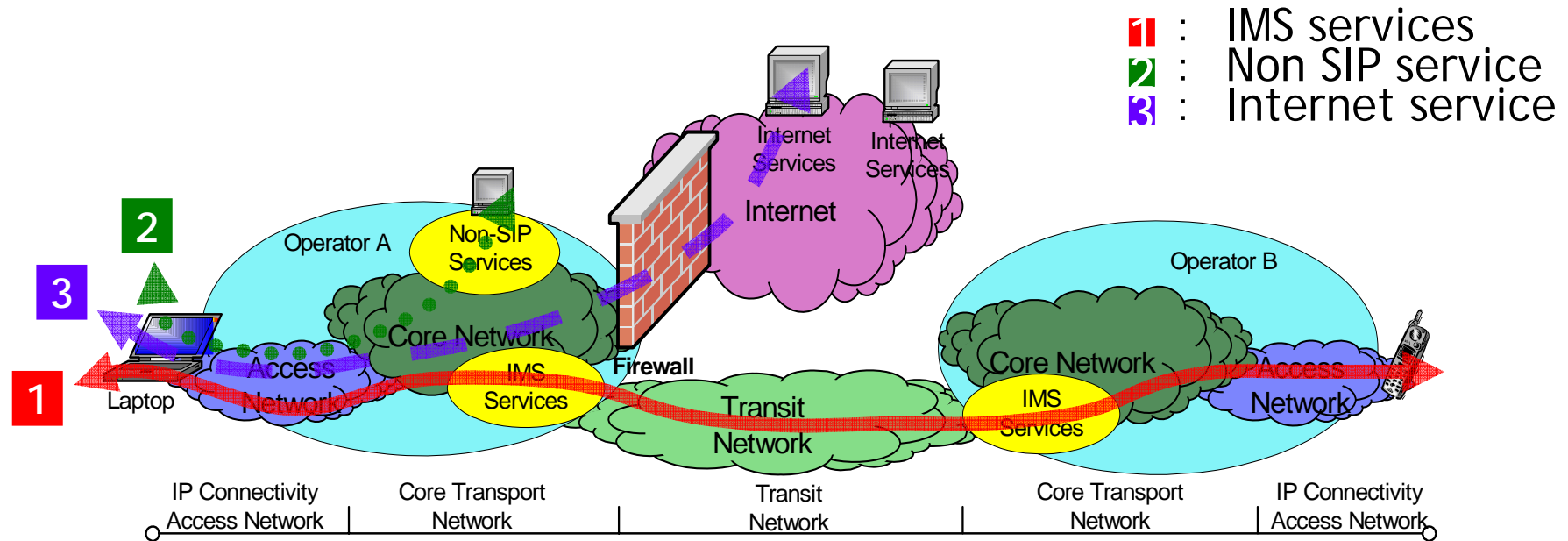
- In IMS nomenclature, the SIP proxy function is called the Call Session Control Function (**CSCF**).
- IMS defines a **mobile-destination (roaming-destination) SIP server (proxy CSCF)** in addition to the **subscribing SIP server (serving CSCF)** to allow authentication and QoS control by the mobile-destination network.
- IMS presumes that the serving CSCF cannot be accessed directly (a walled garden).







NGN example of service domains (Appendix I Figure I.5 of Y.2012)

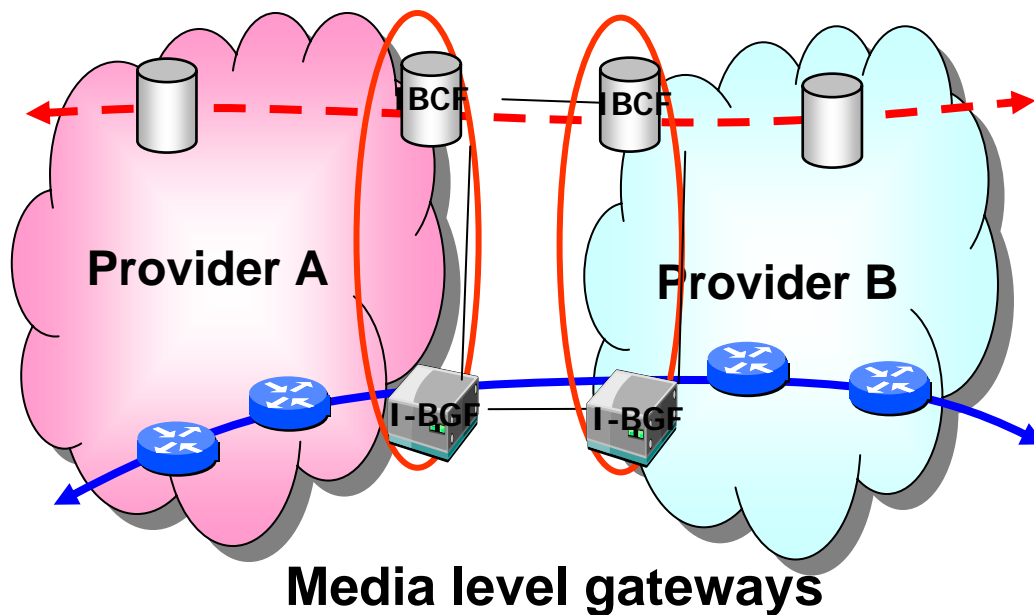




S/BC: Session Border Controller (Supplement 1 to Y.2012)

S/BC allows reliable interworking between different providers.

Signalling path gateways



Examples of functions

1. Support for differentiated QoS
 - Packet rate limiting
 - Validation of priority setting
 - Performance monitoring
2. Protection of the network
 - NAT and firewall control
 - Topology hiding in signalling
3. Additional service features
 - IPv4/v6 translation
 - Codec translation
4. Charging and accounting
 - Packet number counting



Scope of NGN Release 1 and corresponding benefits

NGN release 1 scope

- Re-use and adaptation of 3GPP IMS to provide multimedia services
- A unified IP network with improved security and QoS

Cost saving

Reduction of installation and operating costs

- Broadband access able to provide IPTV
- A variety of mobile and fixed terminals and their profile management targeting FMC
- Media processing to assist content delivery

Versatility

Expansion of service features

- Service delivery platform making use of NGN easily
- Border gateways enabling secure interworking

Friendliness

Creation of new business opportunities

- Evolution scenario of PSTN and short-term solution

Inheritance

Preservation of existing services



Overview of NGN Release 1

