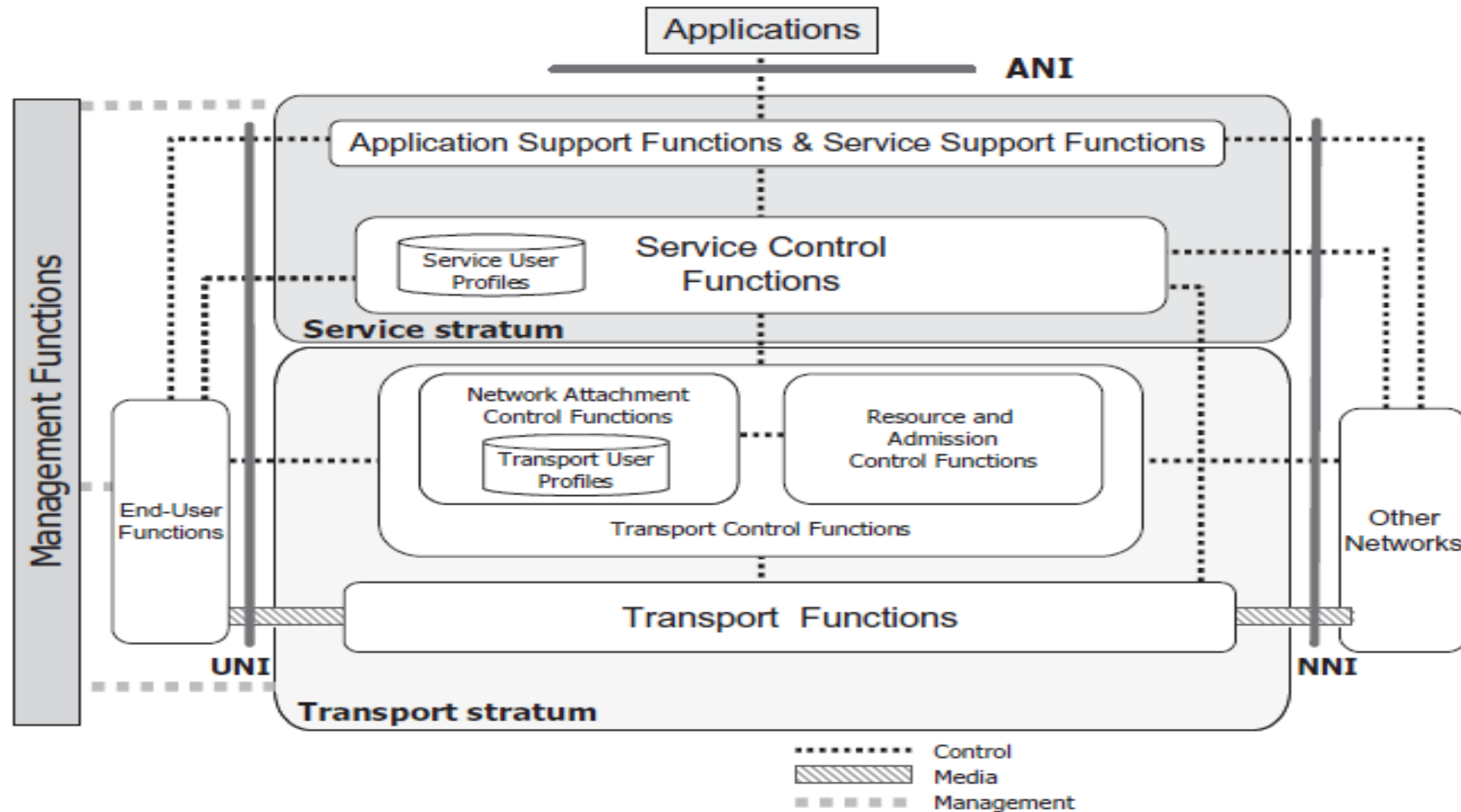


ITU NGN ARCHITECTURE

INTRODUCTION

- IP, Ethernet and Optical technologies will dominate the NGN technology
- For wireline communication, Optical fiber is the future of technology
- For wireless communication, LTE and M-WiMax look promising

ITU- NGN Architecture



ITU-NGN Architecture

ITU- NGN Architecture

- Functions divided into Applications, Service and transport strata
- End user functions are connected by user-to-network(UNI) interface
 - UNI includes both transport and control functions
- Other networks are connected by Network-to-network interface (NNI)
 - NNI also includes both transport and control functions
 - NNI is useful for Interoperability between different domains
- ANI (Application-to-Network Interface) allows third party application development

ITU- NGN Architecture

- Transport Stratum
 - Provides:
 - Physical termination
 - Adaptation
 - Bearer functions
 - Port functions
 - Adaption elements are responsible for providing interconnection to the large variety of access and trunk interfaces.
 - Provides IP-based connectivity and can support the QoS.
 - Divided into:
 - Access and Core networks

ITU- NGN Architecture

- Transport Stratum
 - Other components:
 - Access Functions:
 - Manage access to the network
 - Variety of wireless and wireline access supported
 - Access Transport Functions:
 - Manage transport of access functions across the access network
 - Variety of QoS control mechanisms can be invoked
 - Edge Functions:
 - Process signaling, media and management traffic for further aggregation
 - Core Transport Functions:
 - Carry traffic over the core networks
 - Core transport is equivalent to a multi-line highway

ITU- NGN Architecture

- Transport Stratum

- Other components:

- Gateway Functions:

- Provide and support capabilities to interwork with other networks

- Transport Control Functions:

- Resource and Administration Control Functions:

- Admission and Gate Control activities for voice, video, data and mobile sessions.
 - Admission control involves authentication and authorization.
 - Gate Control involves enforcement of service specific policies

- Network Attachment Control Functions:

- Initialization of end-user Functions for accessing NGN services

- Transport User Profiles:

- Set of cooperating databases
 - Utilized during controlling transport of user information

ITU- NGN Architecture

- Service Stratum

- Stores service profiles of users and provides service control functions.
- Support services from applications and other domains to the end user.
 - Service User Profiles:
 - Implemented using cooperating databases
 - Utilized for allowing and managing access to NGN services by the user
 - Service Control Functions:
 - Include:
 - Service level registration
 - Authentication
 - NGN session control also.

ITU- NGN Architecture

- Management
 - Include network and service management functions
 - Management information Base(MIB) and Interfaces within the network
 - Guarantees expected levels of:
 - Security
 - Reliability
 - Availability
 - QoS
- Services:
 - Fault Management
 - Management of services and sessions at the agreed upon levels even if there are faults.
 - Faults may include Overloads and disasters
 - Monitoring and control of utilization of resources during setup, maintenance and release of sessions

ITU- NGN Architecture

- Management

- Services:

- Configuration Management:

- Developing, monitoring and managing hardware and software configuration of devices, elements and systems.

- Accounting Management:

- Recording the utilization of services and network resources
 - Create billing record

- Performance Management:

- Monitoring the performance of network elements including:

- Transmission links
 - Nodal devices

- Maintain desired level of SLA

- Challenge is to locate and harden performance without overburdening service creation, management and delivery modules

ITU- NGN Architecture

- Management

- Services:

- Security Management:

- Manages user's identification, authentication, authorization, certificate, etc.
 - ITU-T study groups 13 and 17 addresses the issues.
 - Newer and more sophisticated security management mechanisms are required.

ITU- NGN Architecture

- Application Functions:
 - Supports:-
 - Service API
 - Session Control
 - Service Logic
 - Translation and routing logic
 - Directory and policy management functions

ITU- NGN Architecture

- Application Functions:

- Provides:

- Messaging services, such as those used in e - mail and voice mail
 - Processing services, such as automatic speech recognition and credit card processing
 - Value - added IP telephony services, such as virtual second line, Web – based toll - free calling
 - Directory enabled services, such as Freephone/8xx number translation, local number portability, and single number follow - me services for voice telephony
 - IP naming and addressing services including DNS, DHCP, and RADIUS
 - (DNS stands for Domain Name System, as defined in IETF RFC 1035, Dynamic Host Configuration Protocol or DHCP has been defined in IETF RFC 2131, Remote Authentication Dial In User Service or RADIUS as defined in IETF RFC 2865)
 - CLASS 5 Services such as call waiting, call forwarding, conference calling for voice communications service (telephony applications)
 - Virtual Private Networking (VPN) for voice and data
 - Bandwidth Services, Optical VPN (IETF RFC 2547), etc.

Numbering, Naming and Addressing in NGN

- Must support existing Naming, Numbering and Addressing for fixed, mobile and wireless networks
- IDs used in PSTN/ISDN, GSM based PLMN:
 - Name
 - Number
 - Address

Numbering, Naming and Addressing in NGN

	Public ID (User aware)	Format of the Public ID within the network	Private ID (Network Aware)	NGN Layer
User/Service Identifier	Name(s)	SIP URI	ID stored in ISIM	Service
	Number(s)	tel URI SIP URI with domain operator-provided	ID stored in ISIM or derived from USIM	
Network Identifier	Address	Number, and Routing Number IP Address	Network ID Line ID	Transport

Overview of identifiers

Numbering, Naming and Addressing in NGN

- IDs used in TISPAN* NGN:
 - IDs for Users:
 - Stores user IDs in ISIM provided to the subscribers
 - Main attributes of ISIM:
 - Home Domain Name
 - Used during authentication and registration
 - Used to route initial SIP registration to Home operator's IMS network
 - Stored in ISIM
 - Public Identifier
 - Every user has one or more public identifiers
 - Used for user-to-user communication
 - Used for message routing

Numbering, Naming and Addressing in NGN

- IDs used in TISPAN* NGN:
 - IDs for Users:
 - Main attributes of ISIM:
 - Private Identifier
 - At least one private identifier
 - Assigned by the home operator and used to identify IMS user's subscription
 - Used to support authentication procedure during:
 - Registration/Re-registration/De-registration
 - Authorization
 - Administration
 - Accounting
 - It is "Permanent" and stored inside ISIM locally

Numbering, Naming and Addressing in NGN

Identifier	Role within 3GPP	Method of provisioning 3GPP	Method of provision for fixed line access
IP address	Used to support media and signaling stream	Downloaded into terminal from DHCP in access network and uploaded to S-CSCF as part of registration process	Associated with line card as part of service provision process
Private identifier	To identify terminal to system as part of registration / authentication process. Also used for billing	Held in ISIM explicitly or derived from USIM, then loaded into S-CSCF via registration process.	'Pseudo IMSI' provided and held in UPSF as part of service provision process
Public identifier	Used to identify required terminal on incoming calls. Also used as CLI on outgoing calls	Programmed into ISIM and loaded into HSS as part of service provision process.	Programmed into UPSF as part of service provision process.

Overview showing the role of different identifiers and associated handling

Numbering, Naming and Addressing in NGN

- IDs used in TISPAN* NGN:
 - Identification of network nodes:
 - Identified using a valid SIP URI
 - Can be identified from SIP headers
 - Unique names are given to all network elements
 - IDs for services:
 - Requirements of services:
 - Voice
 - Instant Message Services
 - Presence Services
 - Location Services
 - IDs for NGN operators:
 - Format: <element-id>.<service-provider>.<root domain>
 - Needs to be allocated within the public domain namespace
 - Must be unique

Numbering, Naming and Addressing in NGN

- Administration of NGN IDs:
 - Three classes of Identifiers
 - Generated automatically by network elements
 - Allocated by operators with reference to external bodies
 - Adopted from external bodies(e.g. public IP addresses)
- IMSI (International Mobile Subscriber Identity)
 - String of decimal digits, up to maximum 15 digits
 - Used to identify uniquely a mobile terminal or mobile subscriber
 - Consists of three fields:
 - MCC (Mobile Country code) 3 digits
 - MNC (Mobile Network Code) 2 or 3 digits
 - MSIN (Mobile Subscriber Identification Number) rest of the digits