Basic NGN Architecture
&
Principles

Keith G Knightson

Canada

NGN Architecture: Initial Considerations

- NGN difficult to define in absolute terms of:
  - specific technologies
  - specific architecture
  - topology

- Need to avoid technology traps

- Identify high-level paradigms
  - separation of concerns (and related functions)
  - technology agnostic

- Identify emerging NGN-generic issues
  - Architectural principles
  - Need for NGN models to show separation of concerns/functions

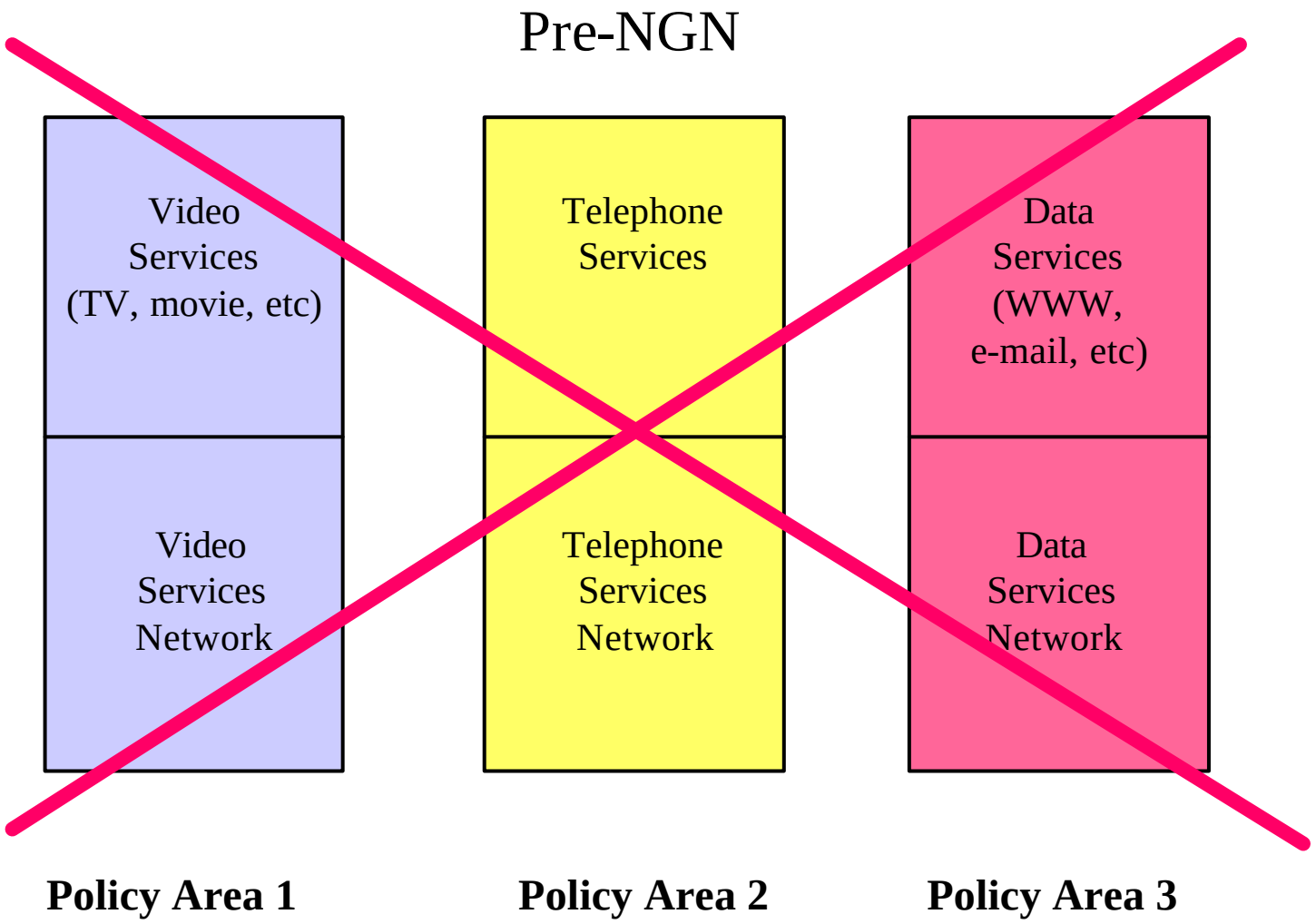
NGN Definition

Next Generation Network (NGN): a **packet-based** network able to provide telecommunication services and able to make use of multiple broadband, **QoS-enabled** transport technologies and in which **service-related functions** are independent from underlying **transport-related technologies.**

It enables unfettered access for users to networks and to competing service providers and/or services of their choice. It supports **generalized mobility** which will allow consistent and ubiquitous provision of services to users.

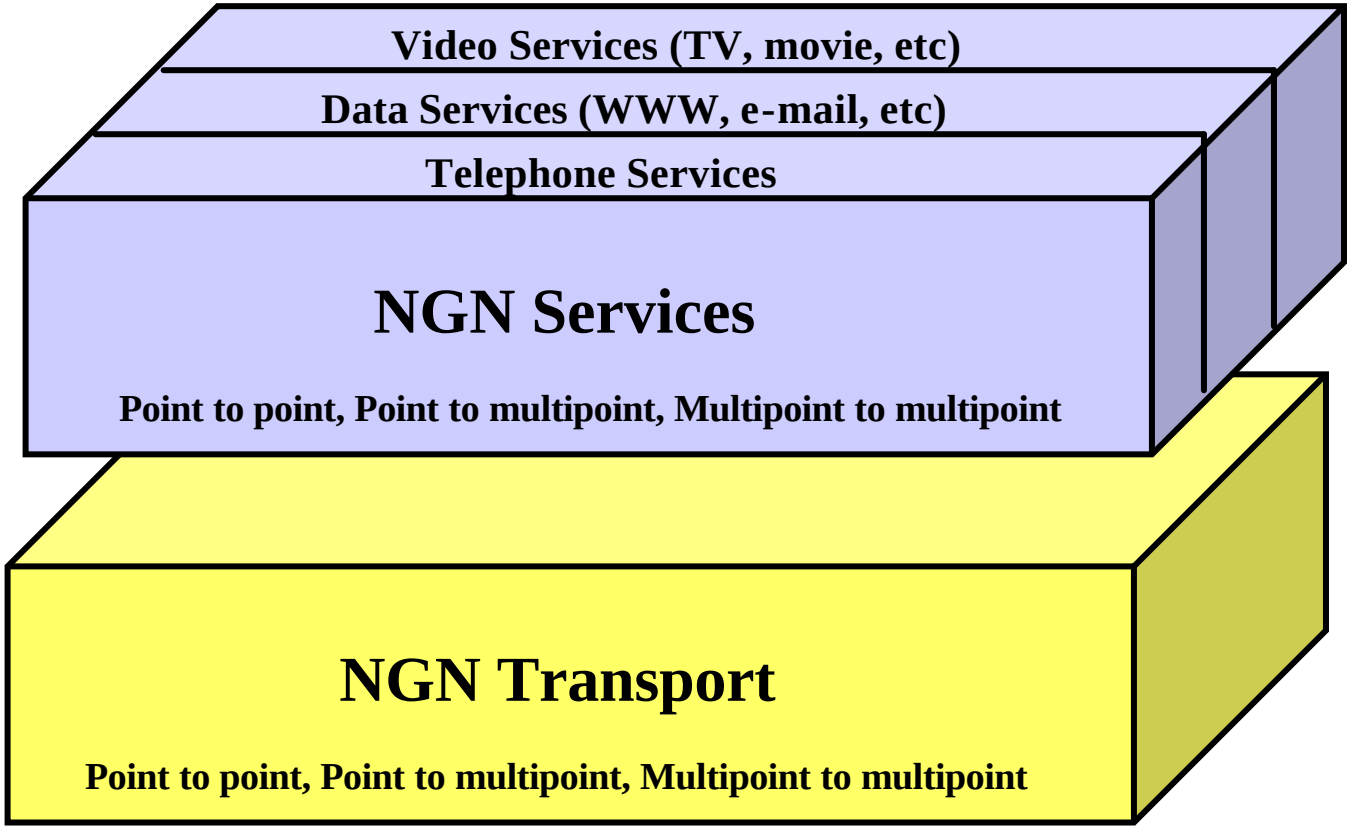
ITU-T Recommendation Y.2001

What's old: Vertically-Integrated Networks



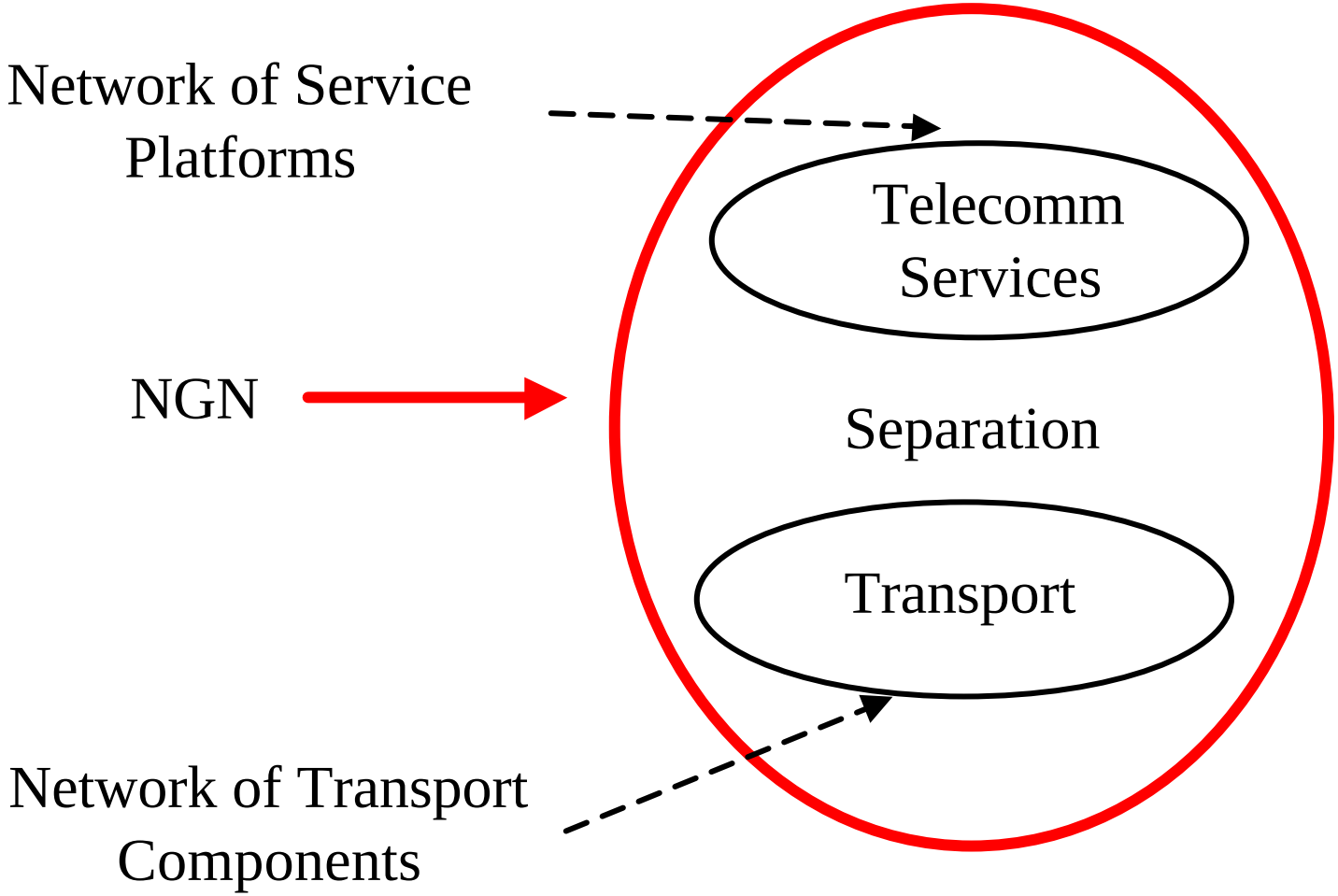
What's New: Horizontally-Integrated Networks

NGN - Convergence Model

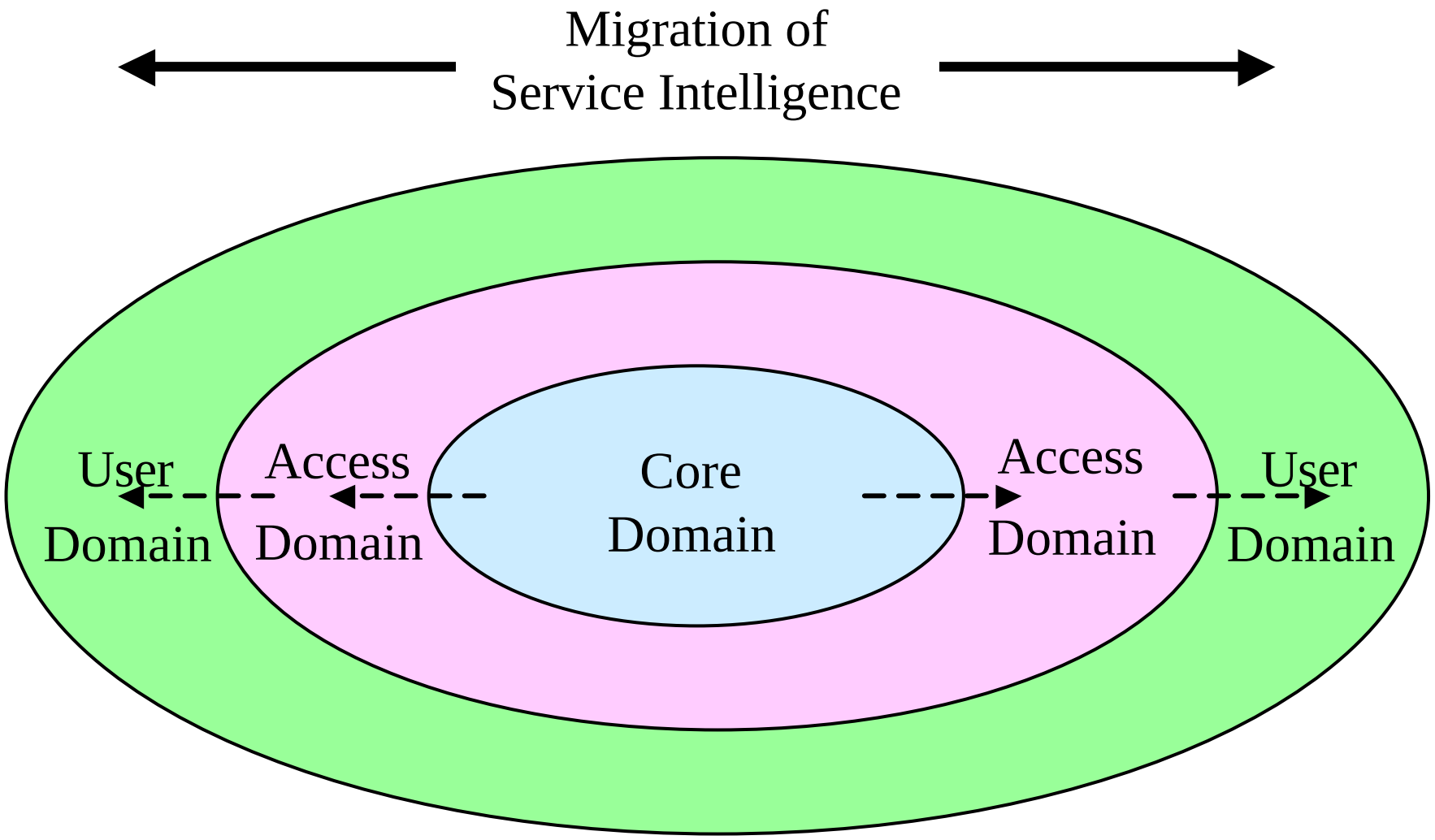


ITU-T Recommendation Y.2011

Networking Aspects

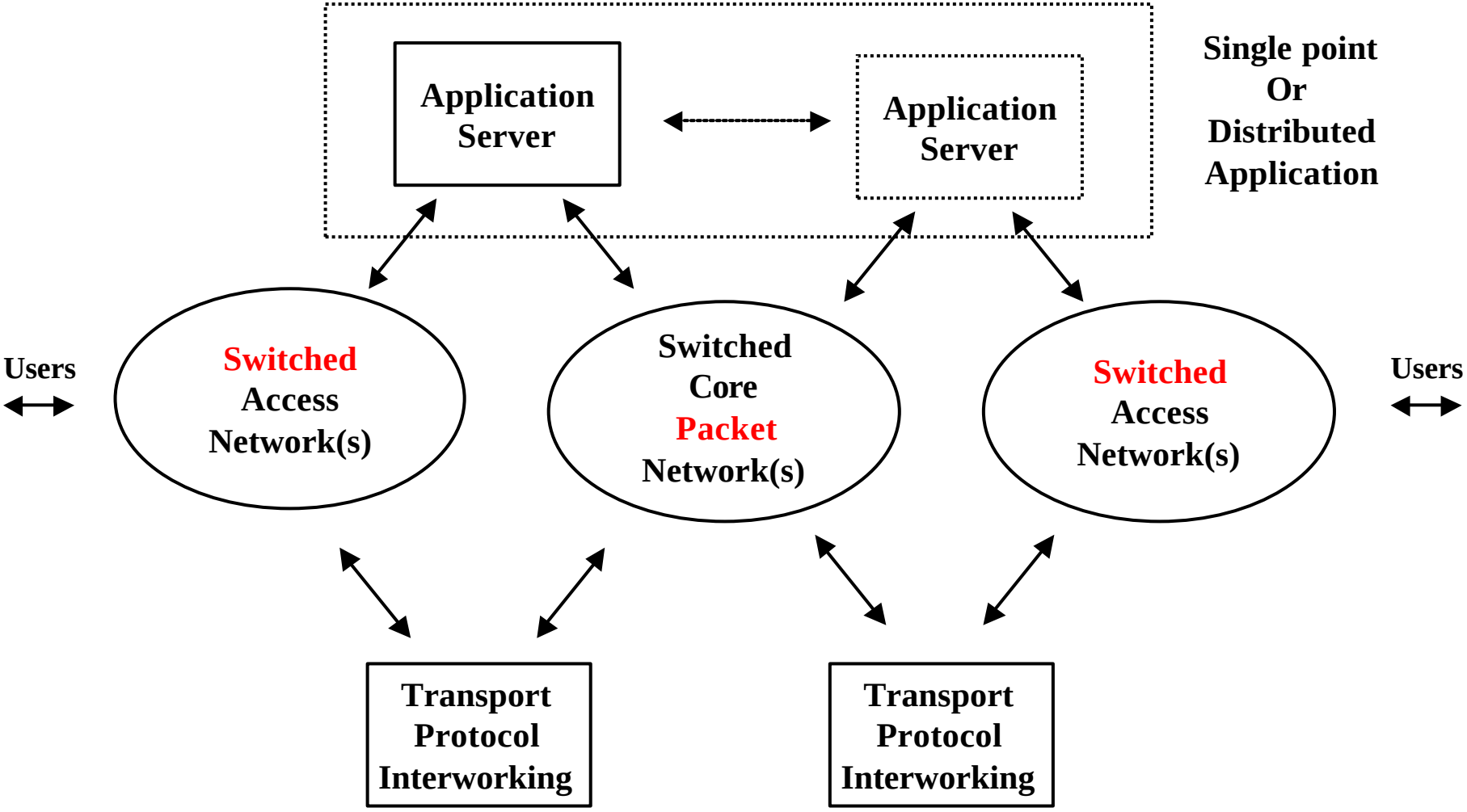


Re-distribution of Service Intelligence



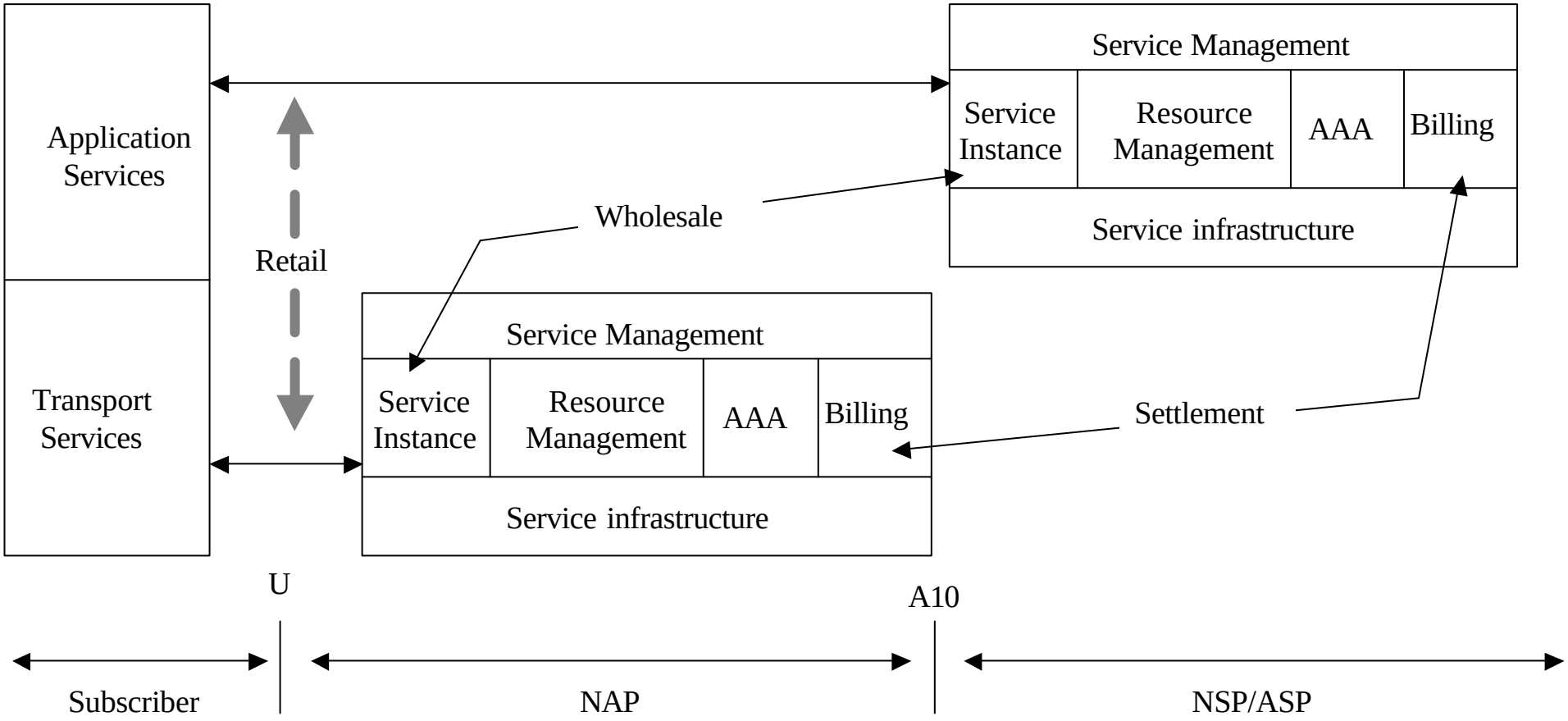
No 1:1 location correspondence between a switching component and a service component

Service Separation



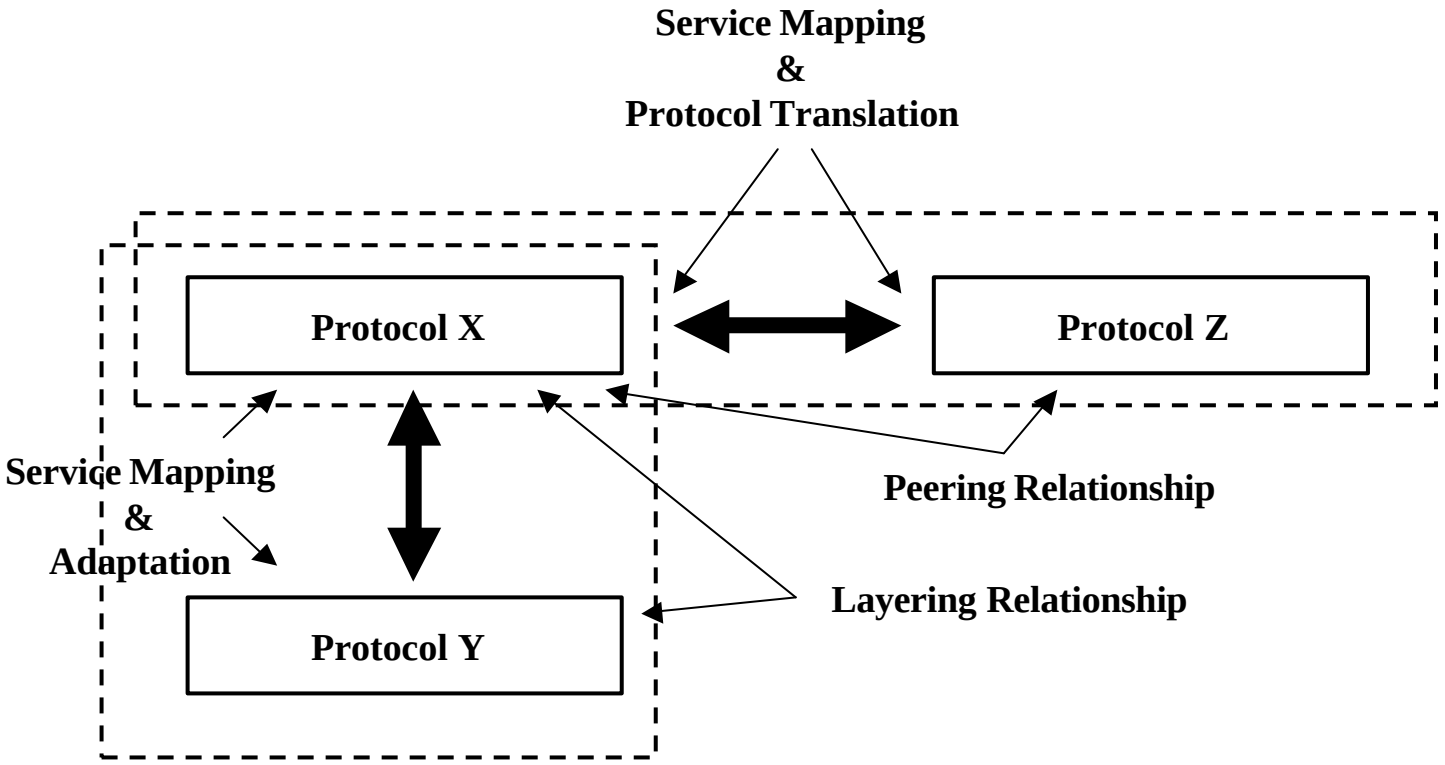
Transport only provides transfer between service platforms

Decoupling Services from Transport Network



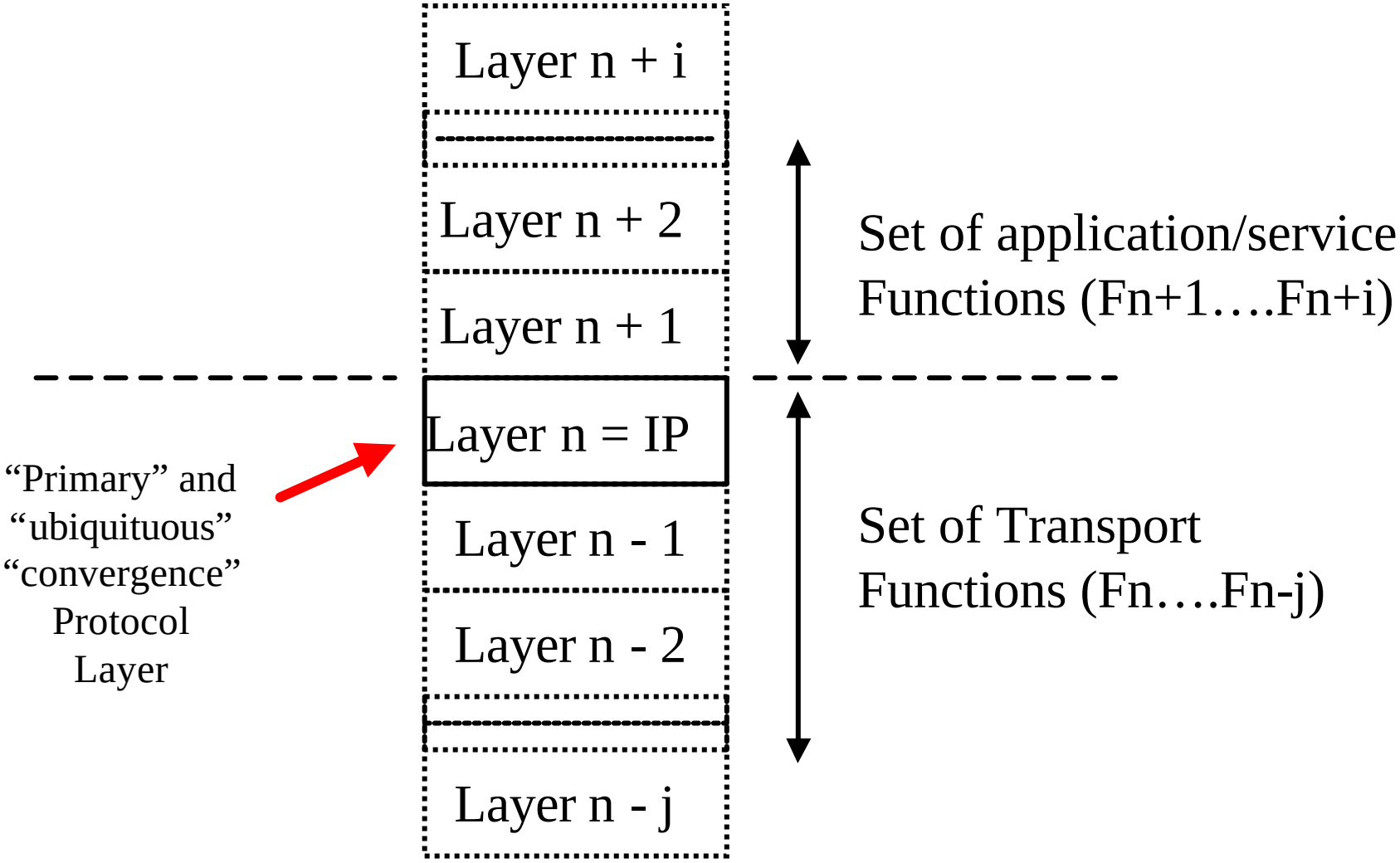
Architectural and Business implications involved

Protocol Architectures: Layering Considerations



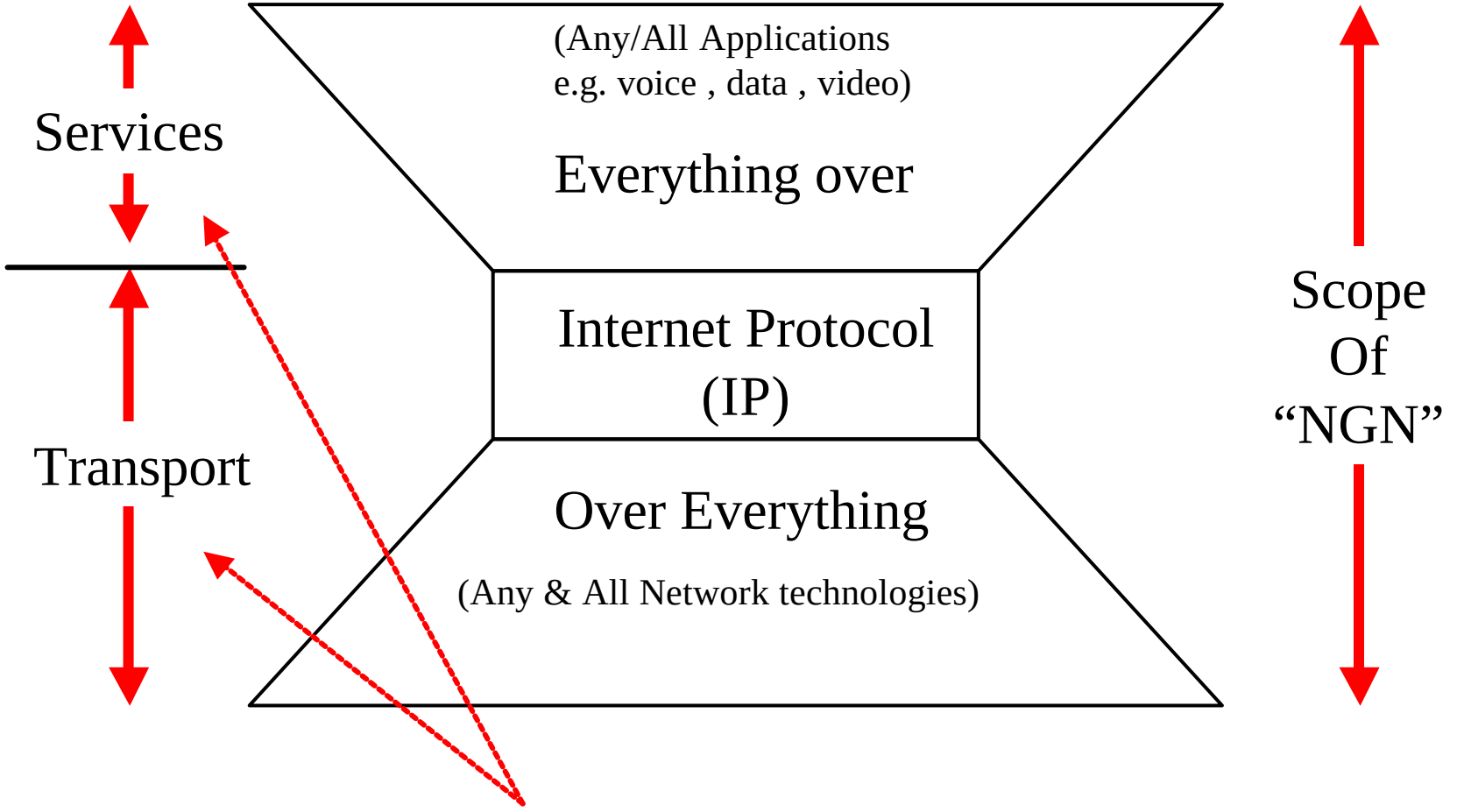
No particular prescribed protocol hierarchy:
Any X over any Y
Layer Network see G.805/809

Protocol Architectures: Convergence Layer



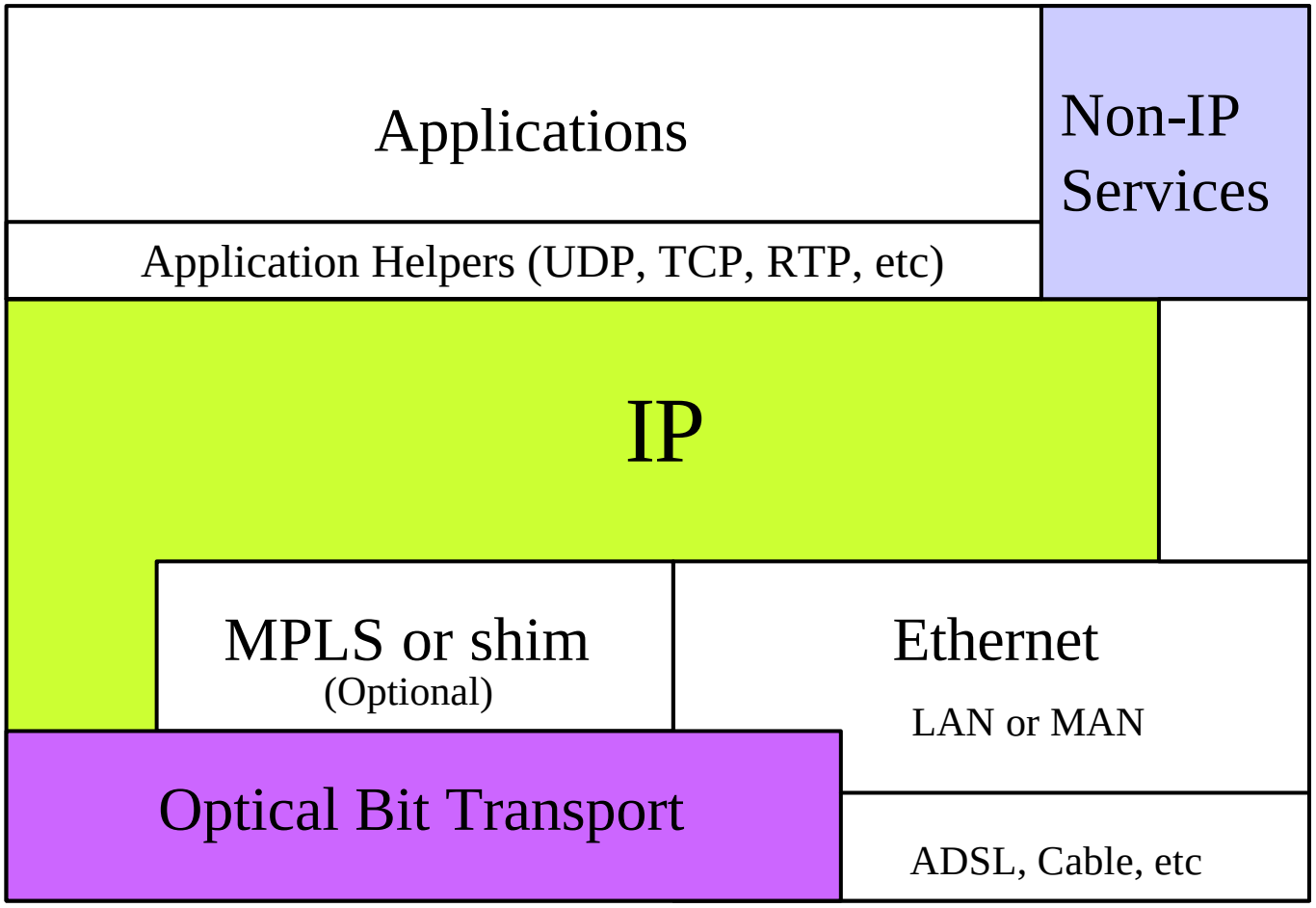
G.805/G.809 principles apply

NGN: IP as the Network Layer Protocol



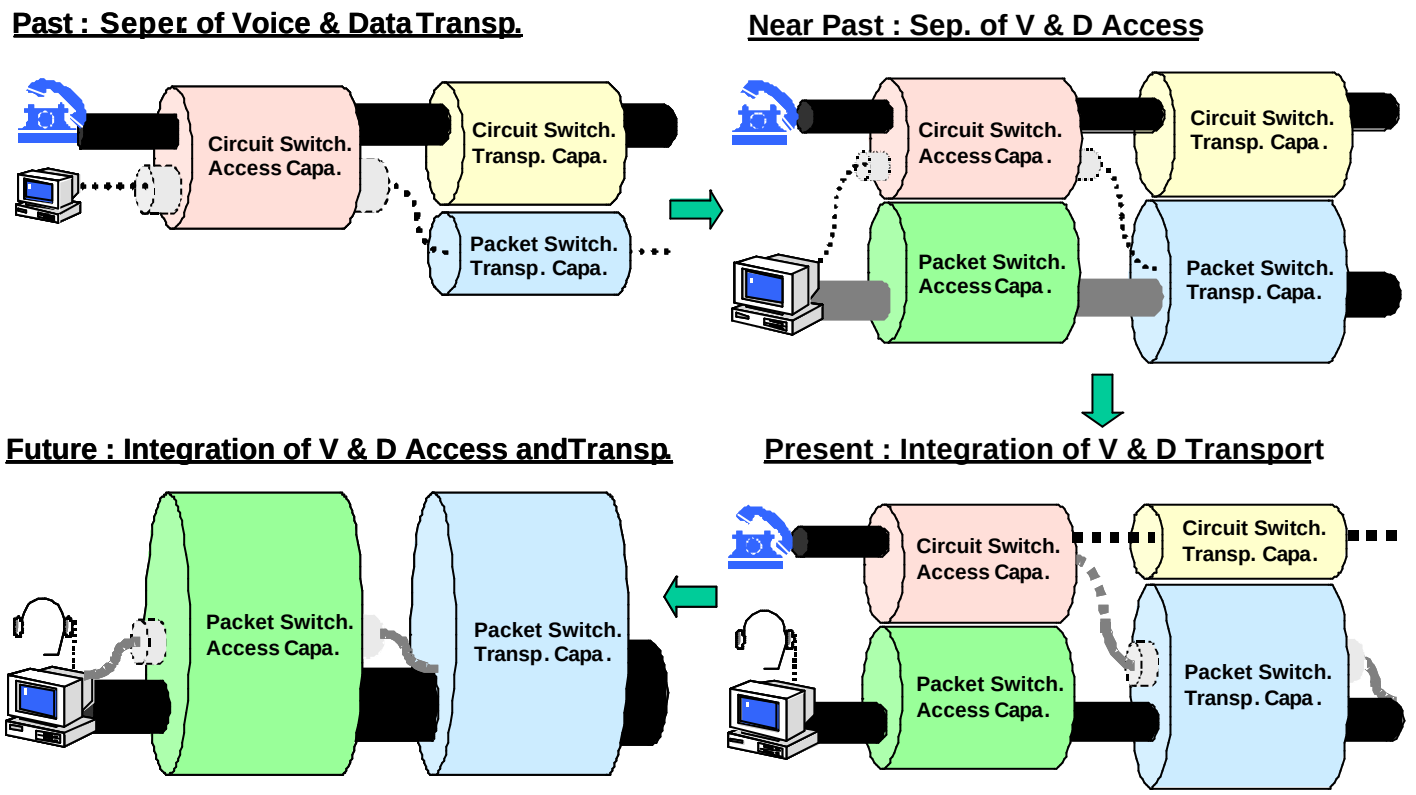
Two Architectural Domains
(Potentially two business and policy domains)

Simplified Protocol Architecture

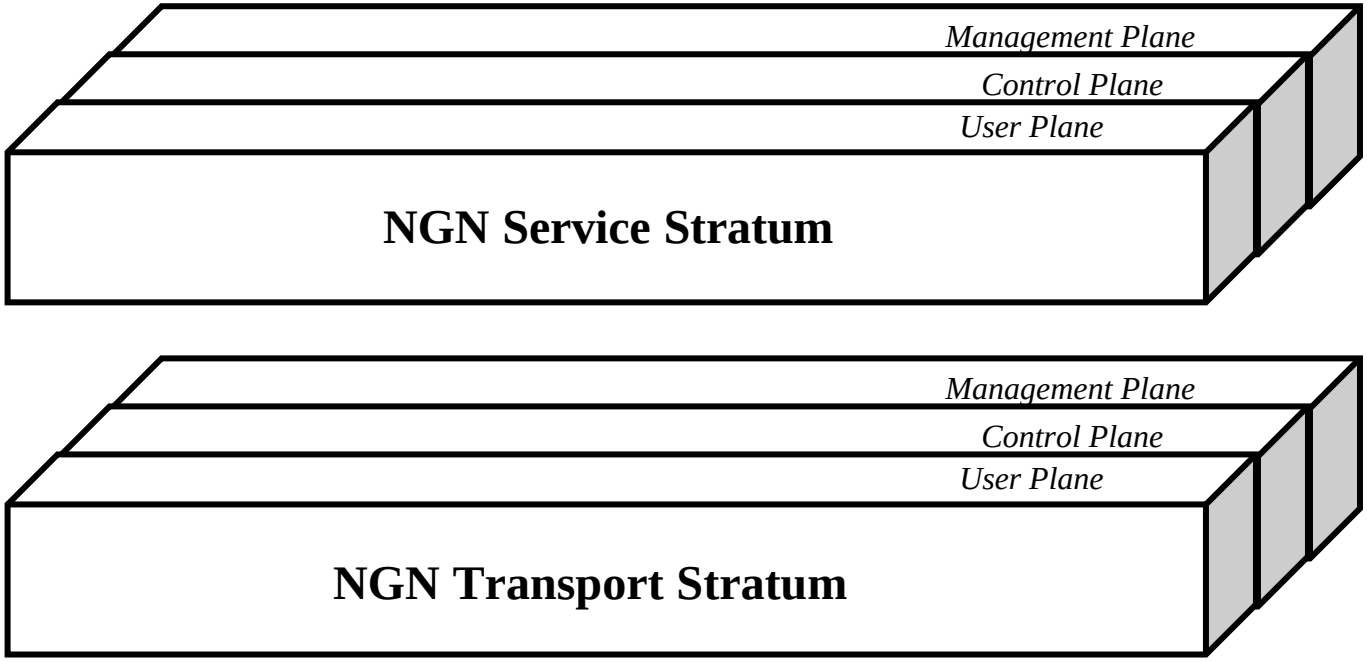


Not exhaustive, other combinations possible, but….
Convergence based on IP is the architectural trend

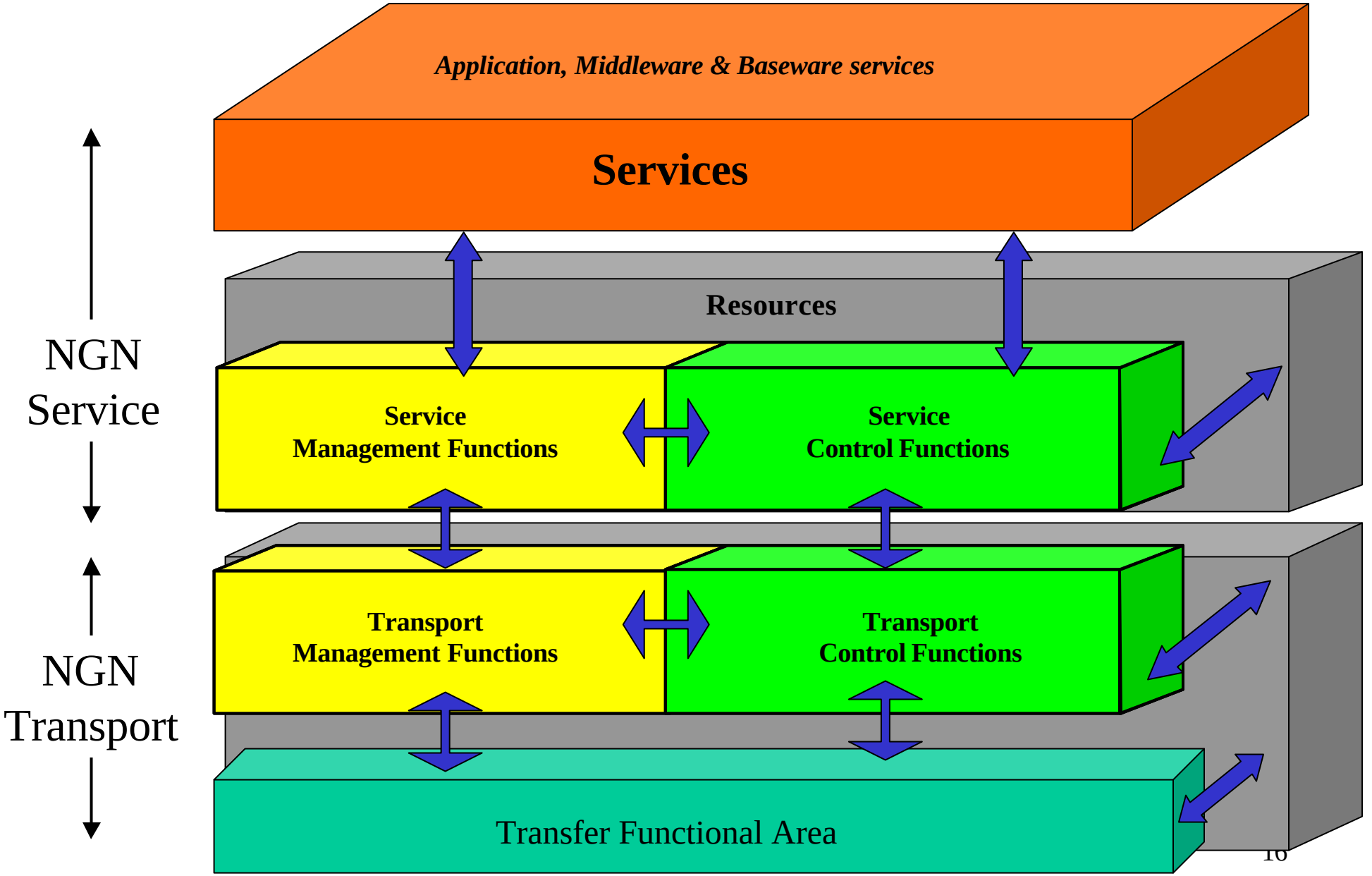
Transport Convergence



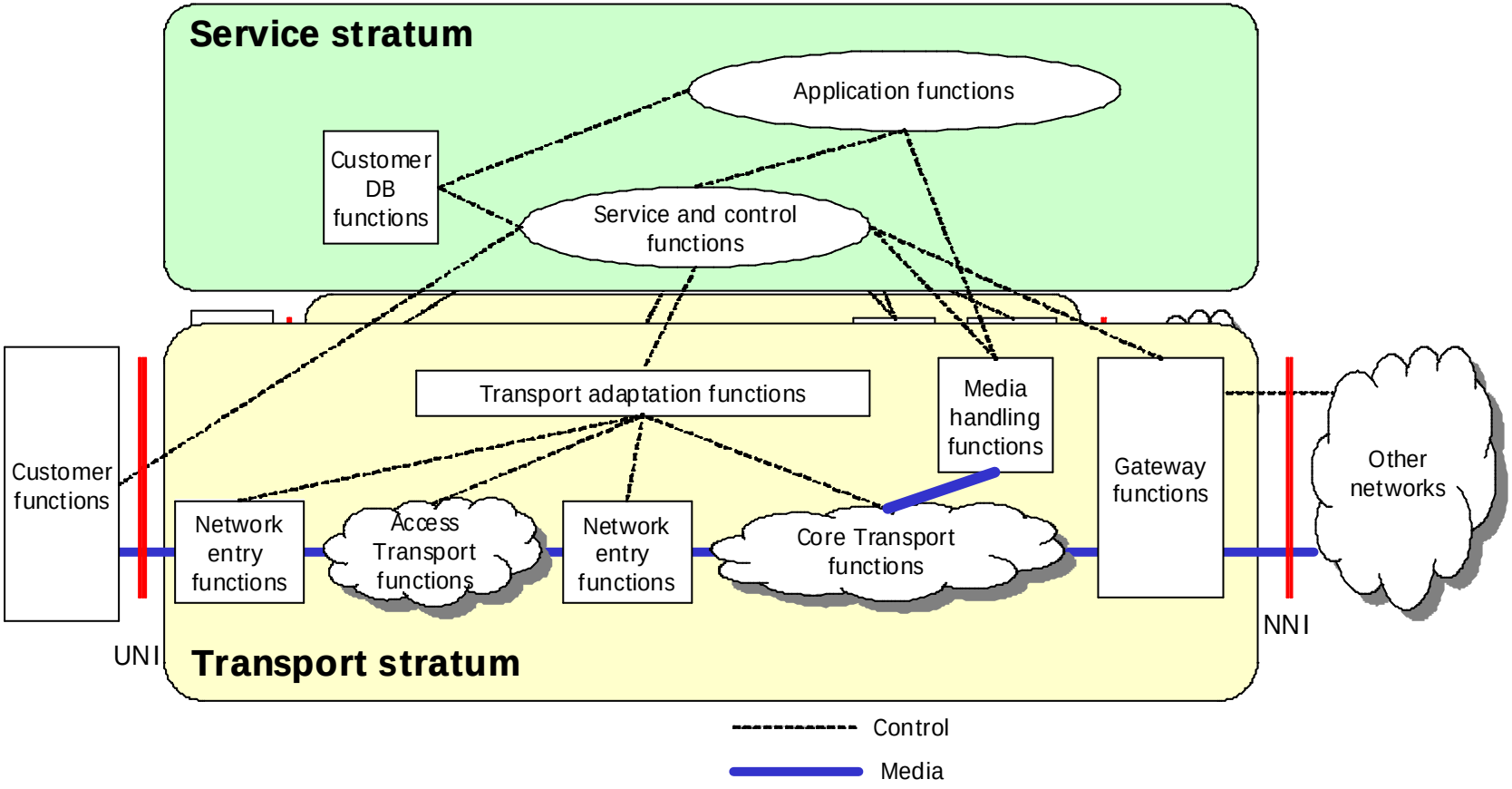
Y.2011: Basic Functional Separation



Y.2011: Basic Functional Architecture Considerations

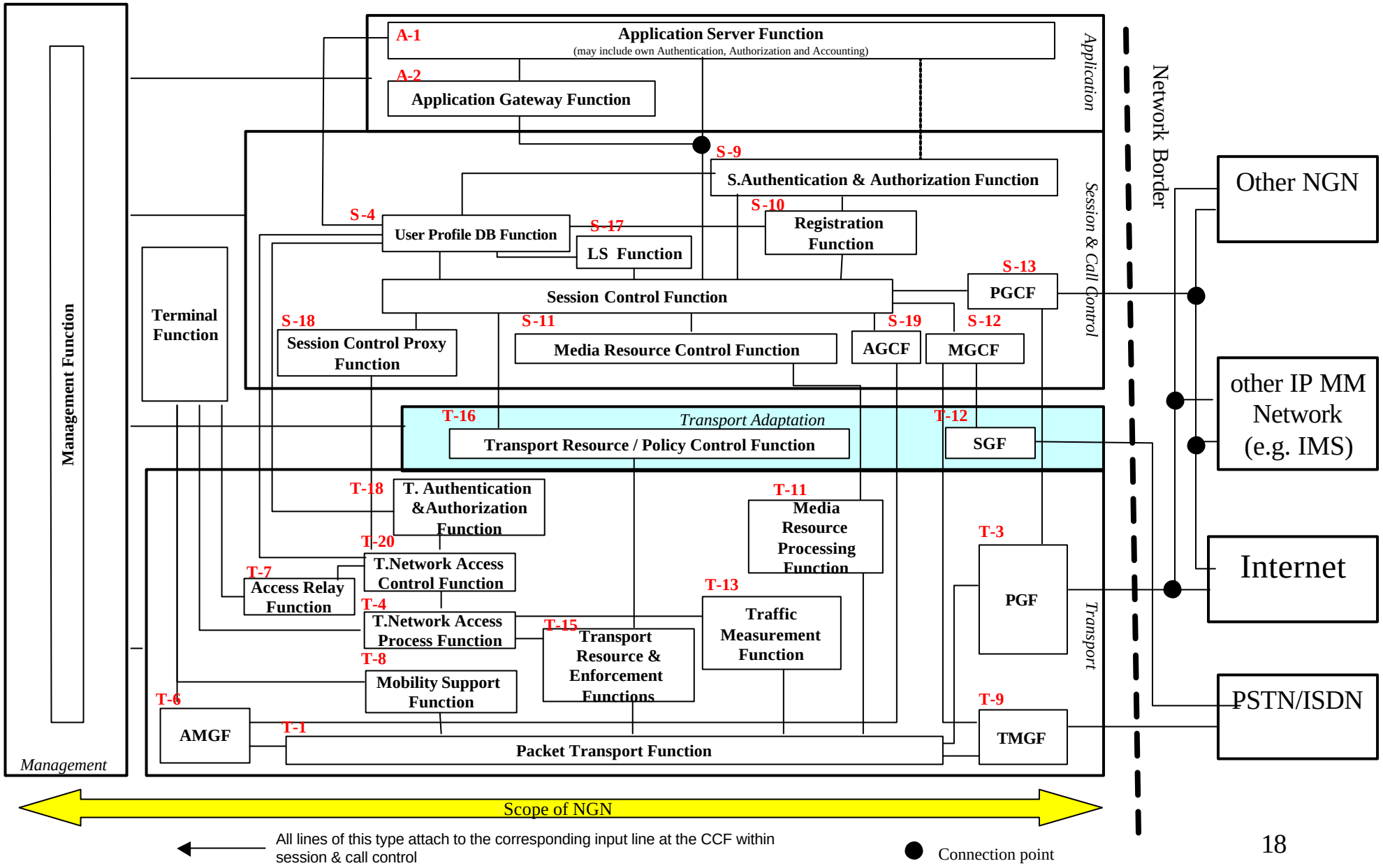


Basic Functions

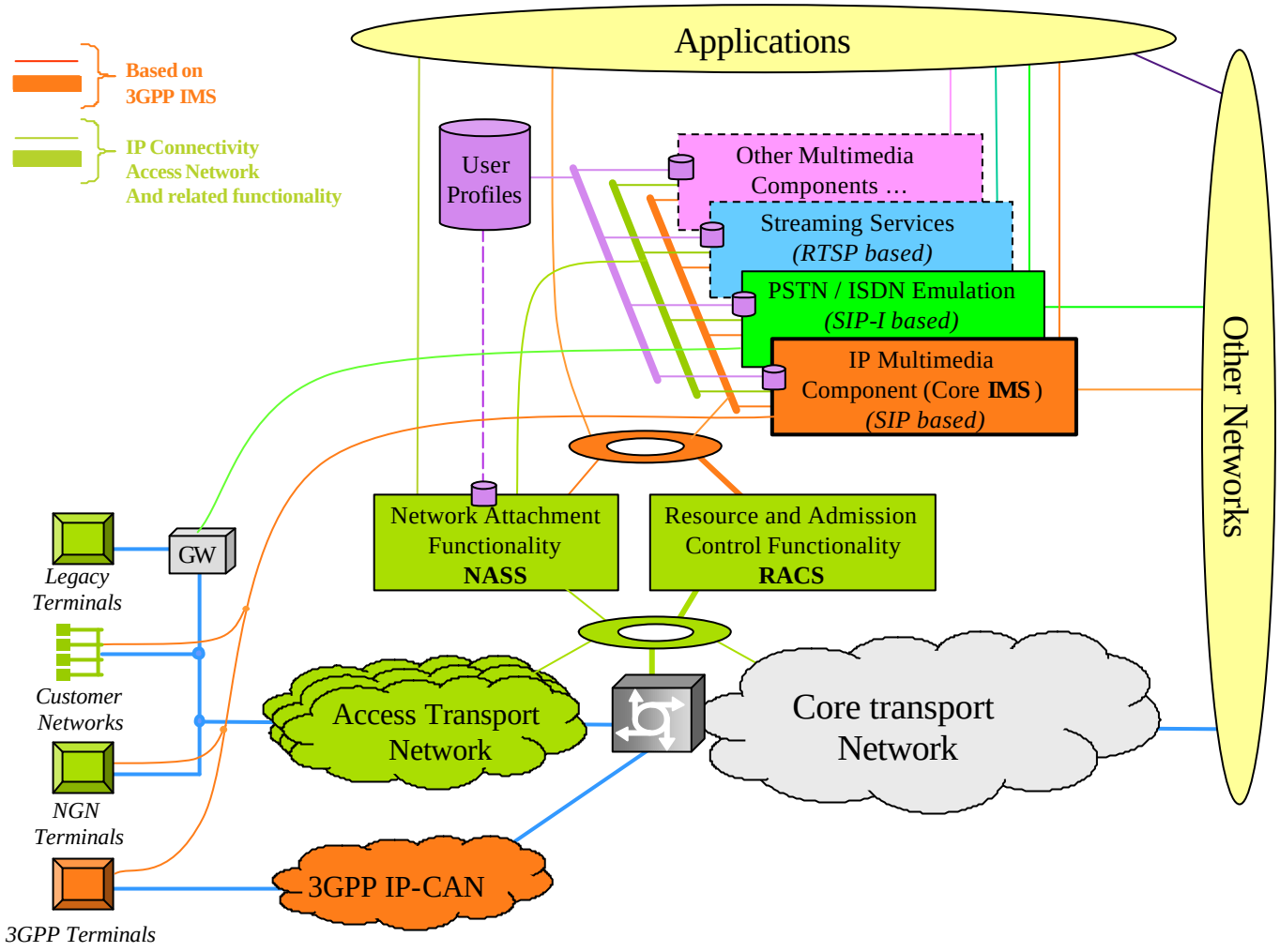


Note: Charging and billing functions and Management functions are applied to both Service and Transport strata

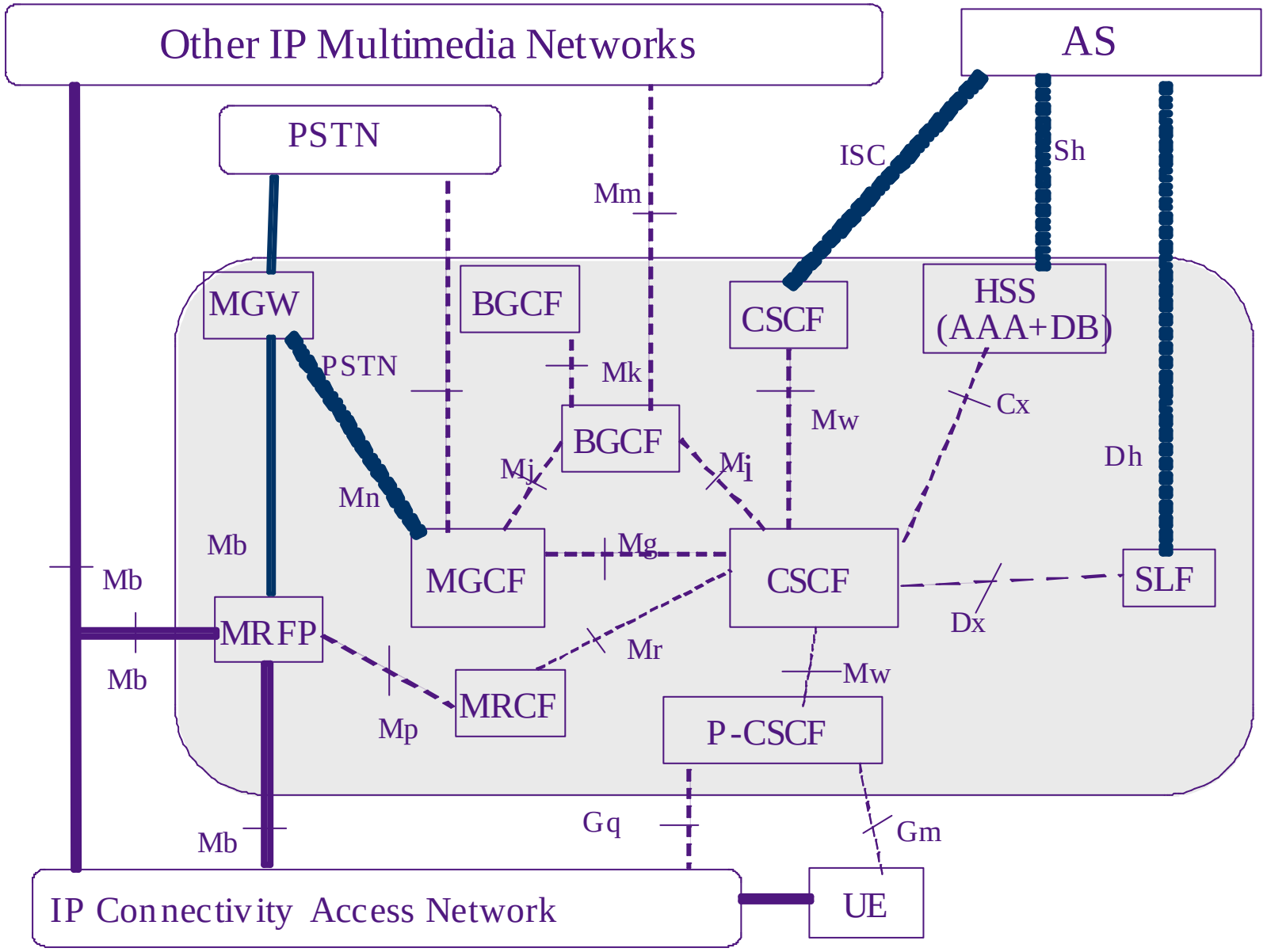
Y.FRA - Functional Requirements & Architecture



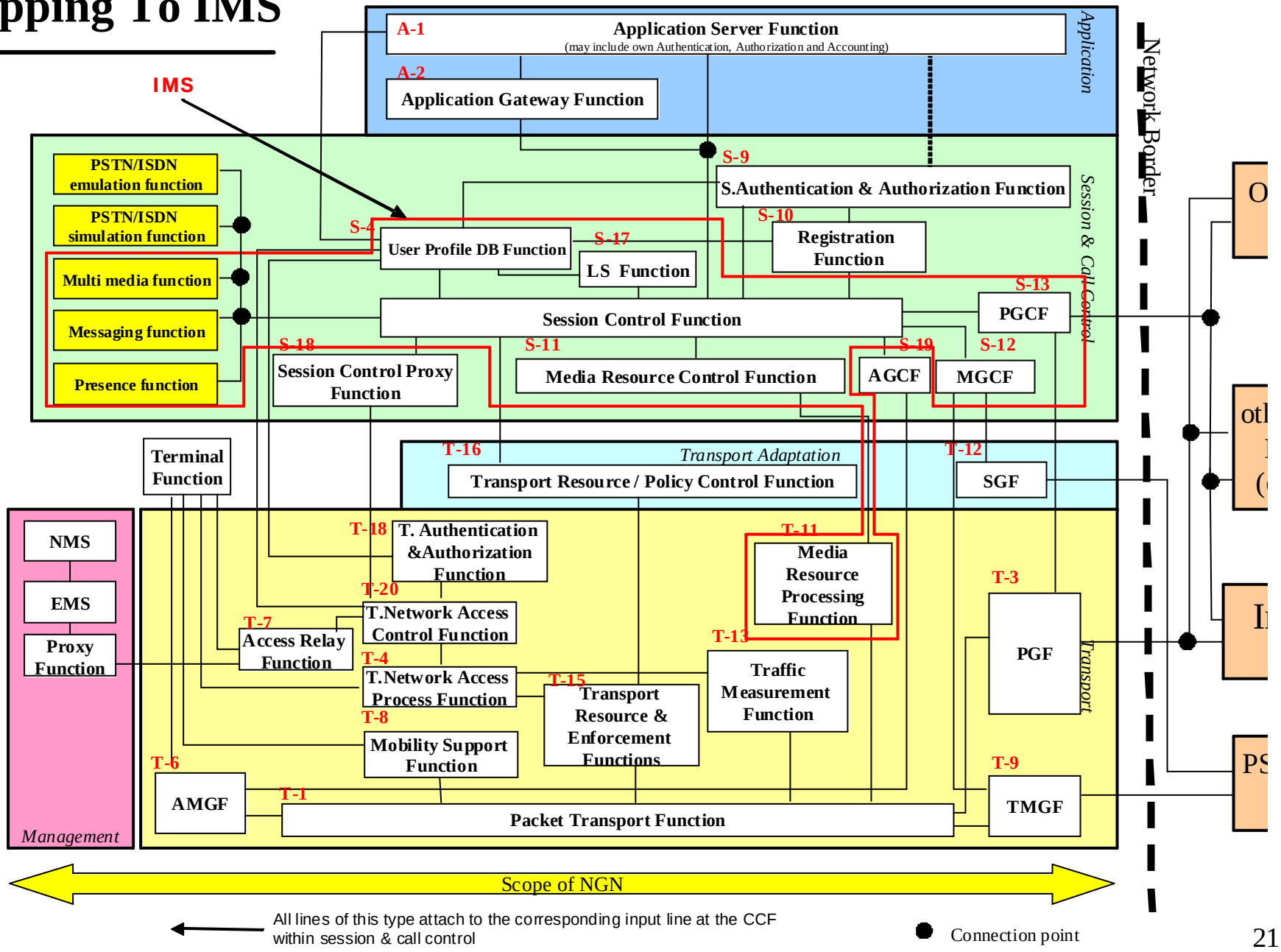
Component/packaging viewpoints



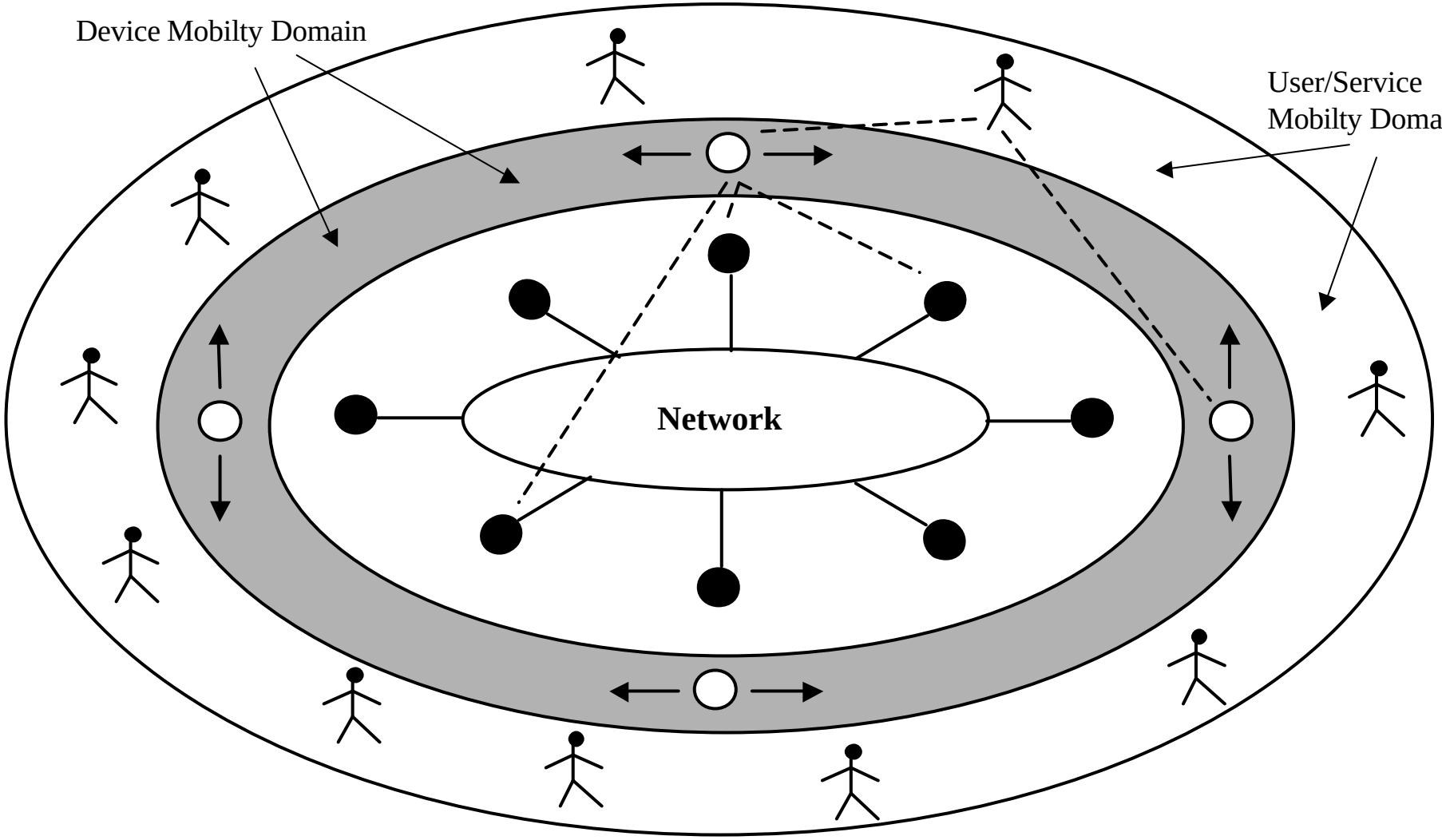
IMS Architecture



Mapping To IMS



“Generalized” Mobility



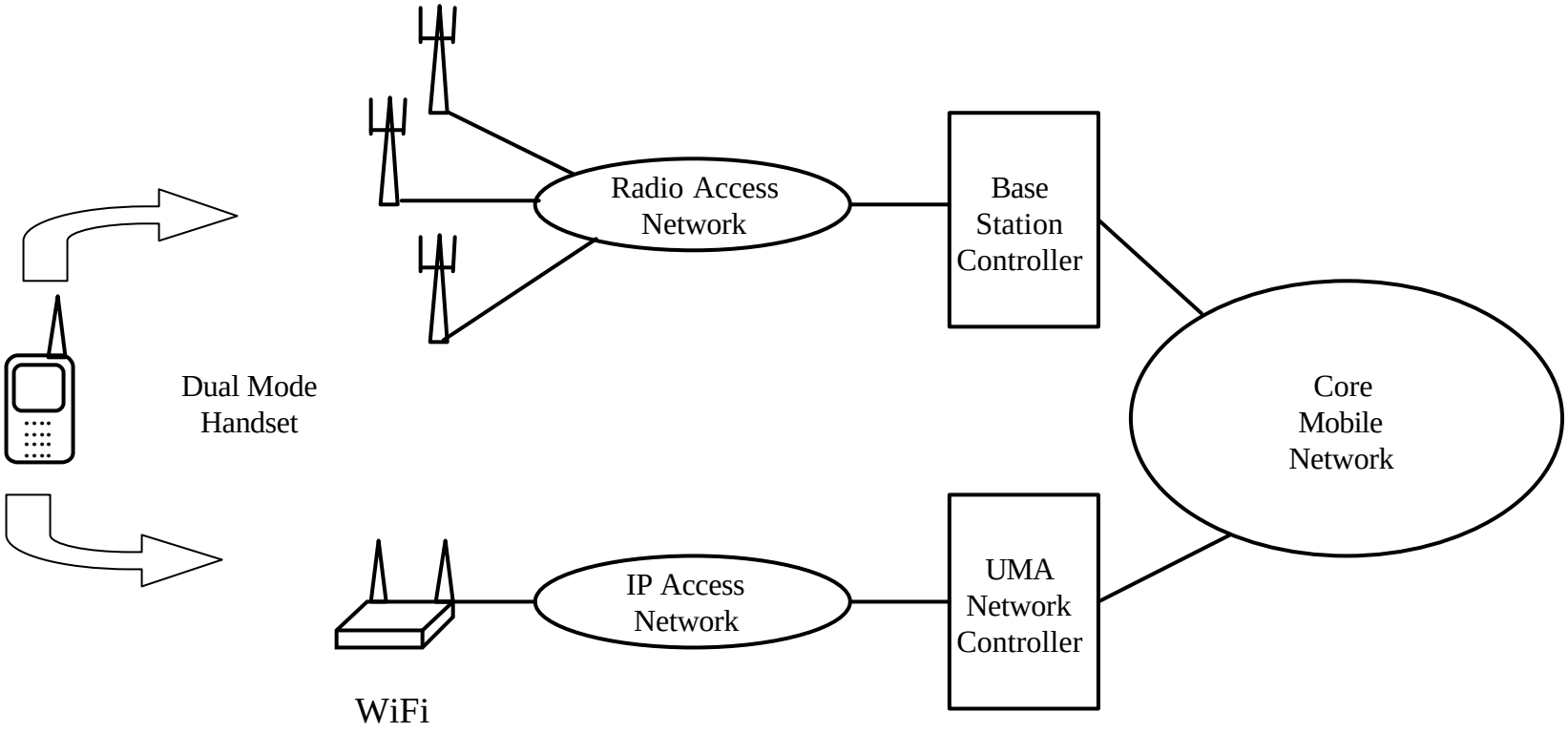
Legend:

Points of Attachment (POA) <u>fixed or wireless</u>

Communications Objects (mobile with transient binding to POA)

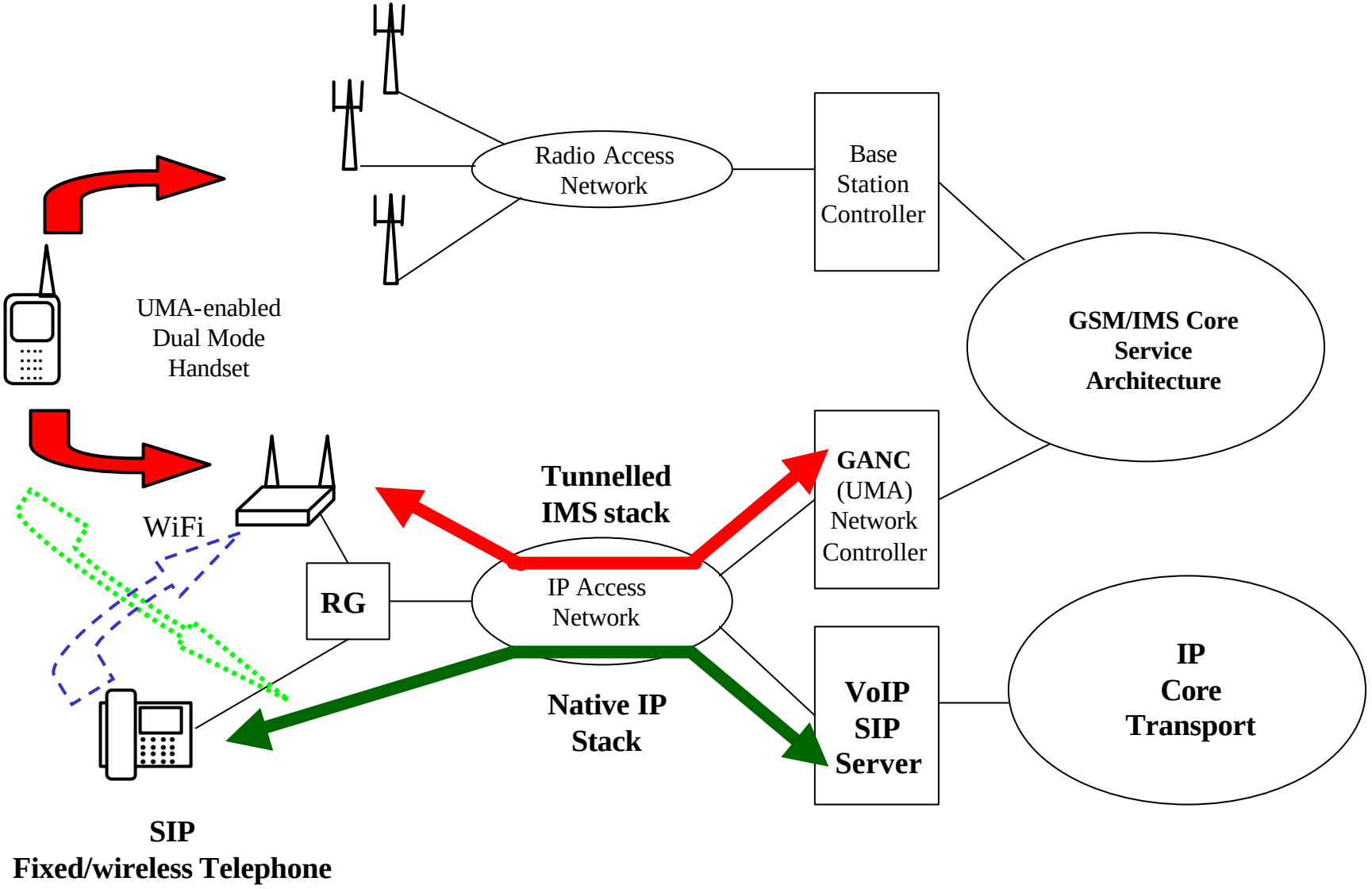
Transient Binding

Fixed/Cellular Mobility

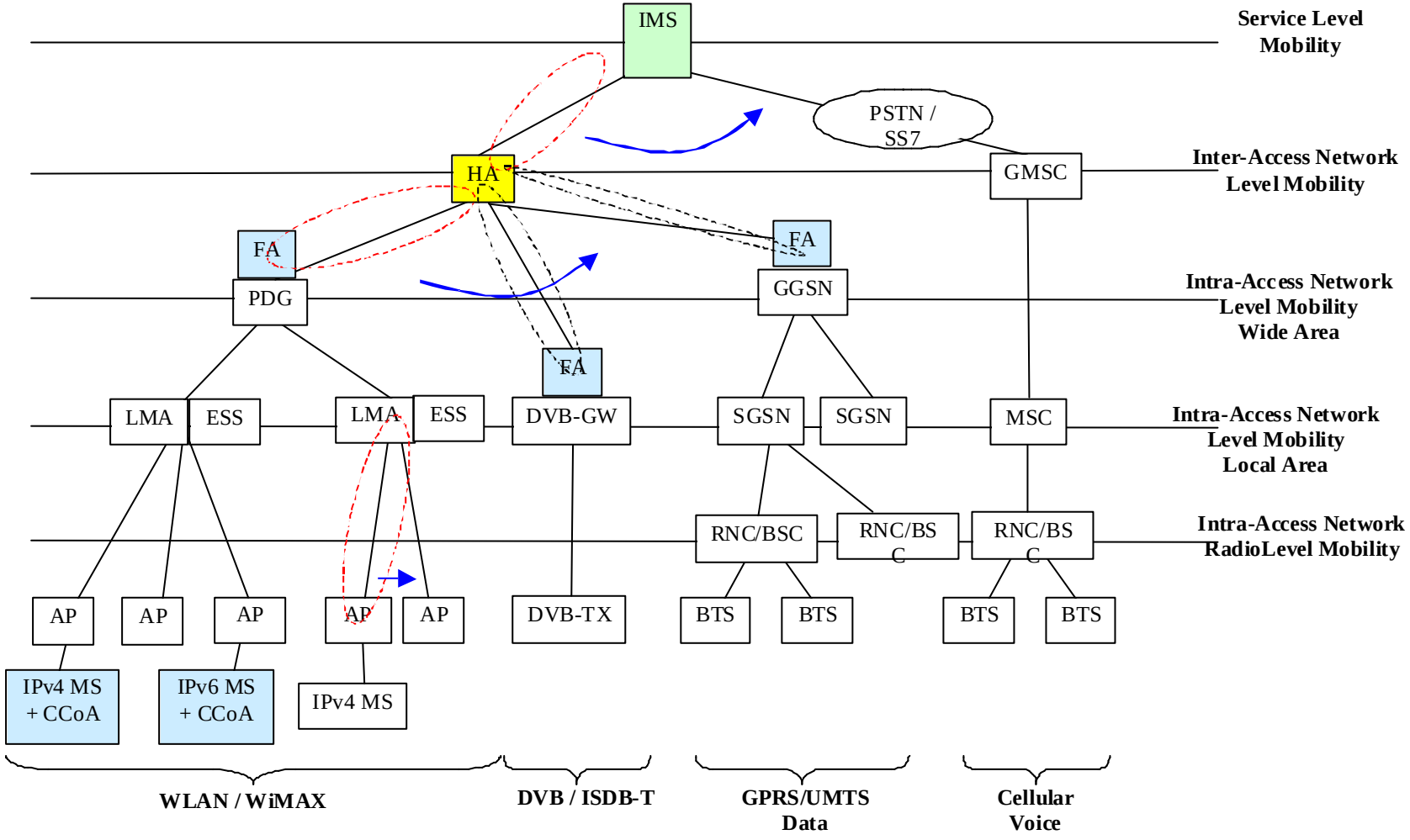


How to integrate with fixed VoIP service?
Cross Architectural impacts?

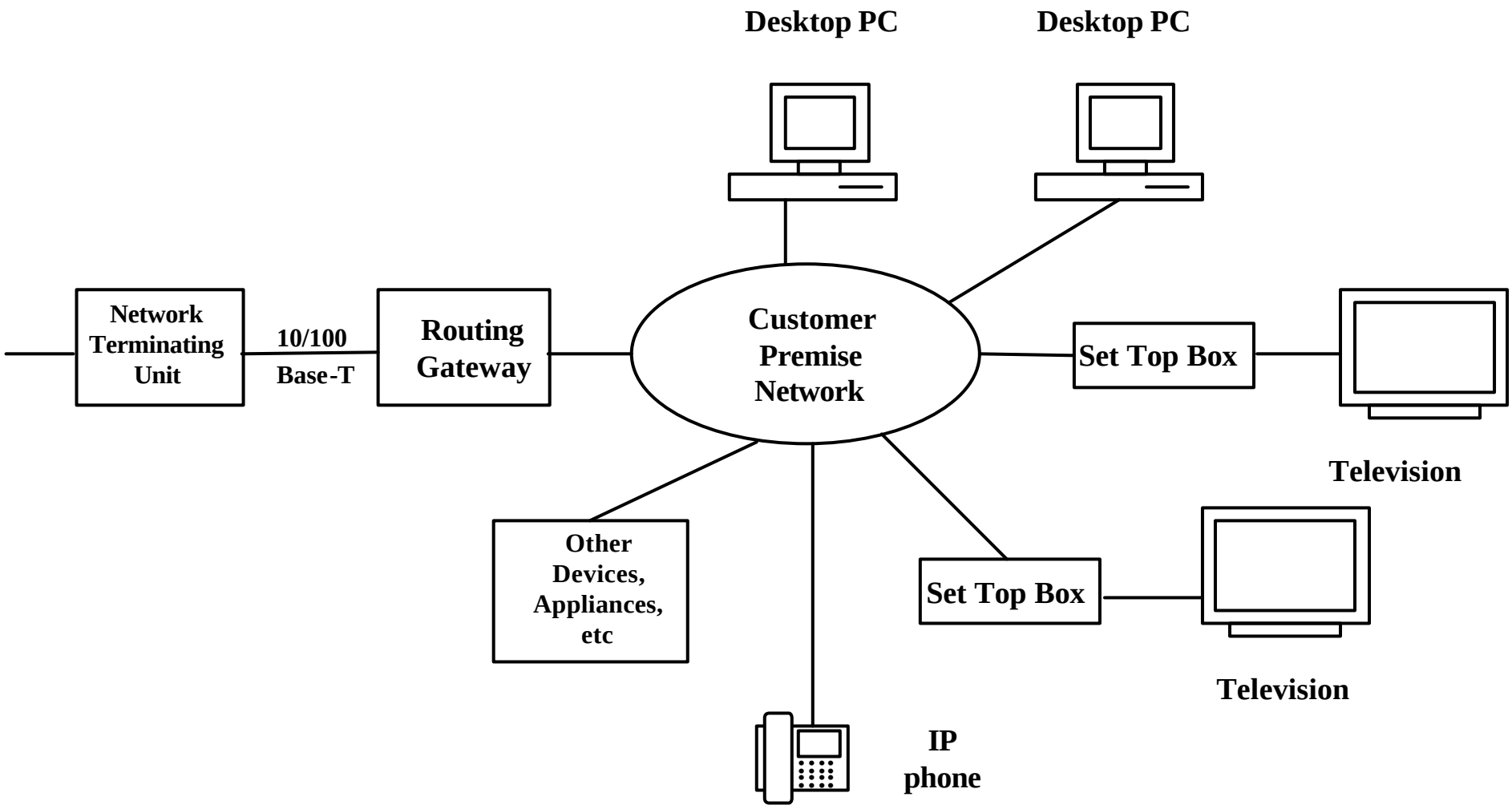
Co-existing/converging mobile and fixed



Scope and extent of Mobility levels

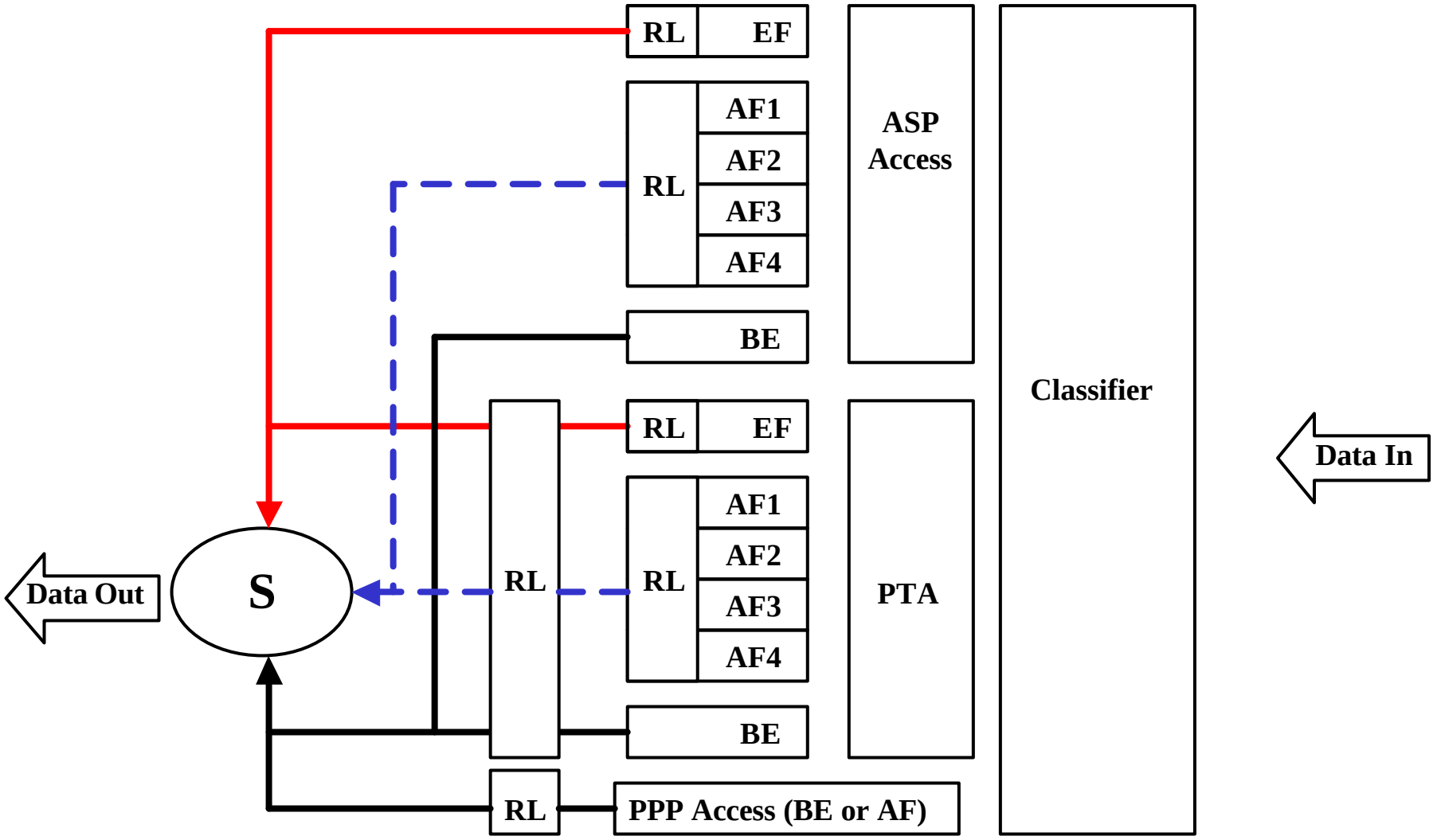


Home Gateway Functionality



QoS per device/terminal

Traffic shaping in Routing Gateway



PTA = PPP Termination Aggregation
RL = Rate Limiter
S = Scheduler

Summary of Relevant Work

- Y.2001: NGN Overview
  - NGN Definition, Characteristics & Subject Areas

- Y.2011: General Reference Model
  - Identify high-level paradigms
  - Separation of concerns, services from networks
  - Identify emerging NGN-generic issues
  - Architectural principles
  - OSI model relevance
  - G.805 relevance

- Y.FRA: Functional Requirements & Architecture
  - Service control functions
  - Transport control functions
  - Mobility management functions
  - Wireless and Fixed access
  - IMS positioning
  - Multi-terminal/multi-QoS Home Gateway

Thank you

for your attention