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NGN Migration scenarios and strategies:
A vision from ITU Specifications

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Some Terminology

- **Evolution to NGN: A process in which *whole* or *parts* of the existing networks are *replaced* or upgraded to the corresponding NGN components providing *similar or better* functionality, while attempting to *maintain* the services provided by the original network and the possibility of *additional capabilities***
  - ➢ **From ITU-T specification Y.2261: PSTN/ISDN Evolution to NGN.**
- **Migration to NGN synonymous to evolution to NGN**
- **SoftSwitch and Call Server terms synonymous**

The NGN Migration Problematic

- **Developing countries characterized by:**
  - ➤ **Growth of their voice service market**
  - ➤ **Dilemma to grow with legacy PSTN/ISDN or with NGN**
  - ➤ **Inter-working with existing legacy equipment**
  - ➤ **Seamless continuity of services**

- **Plus the possibilities offered through NGN migration to grow new markets (broadband, triple-play) and enrich infrastructure competition between distinct access platforms**

- **Need for a *phased* approach for operators with existing *legacy* equipment**
  - ➤ **Example scenarios from specification Y.2261**

Migration Scenarios Envisaged by Y.2261

- **Call Server (SoftSwitch) based approach of the Core network with three variants (scenarios):**
  - ➢ **Scenario 1: Migration starts from Local Exchanges (LE)**
  - ➢ **Scenario 2: Migration starts from Transit Exchanges (TE)**
  - ➢ **Scenario 3: One-step approach**
- **One step evolution of the core network to IP Multimedia Subsystem (IMS)**
- **xDSL Access network evolution to NGN**

Core network consolidation before migration

- **Reduce number of LE and transfer of affected user access modules (UAM), Private Automatic Branch Exchanges (PABX) and Access Network to remaining LEs.**
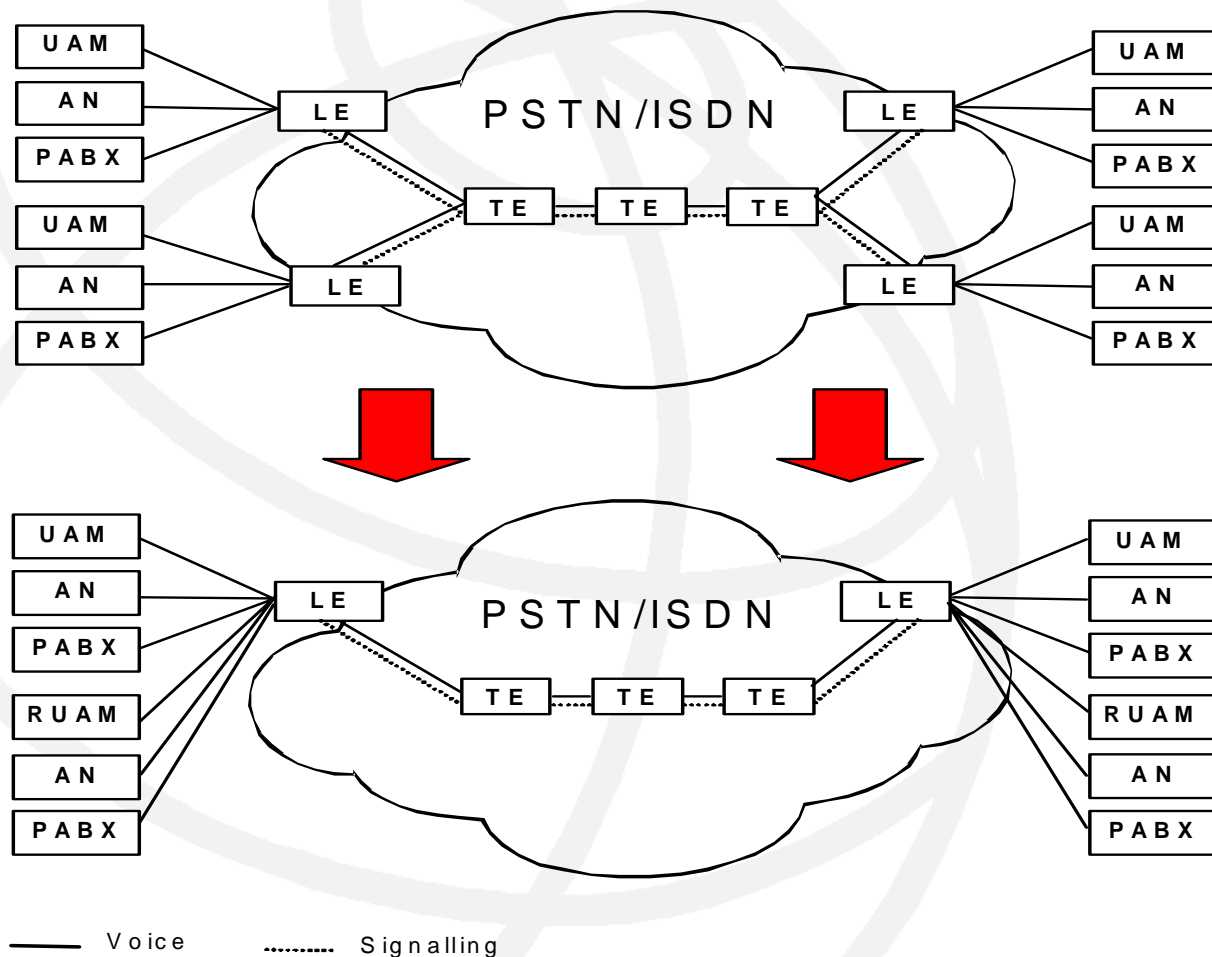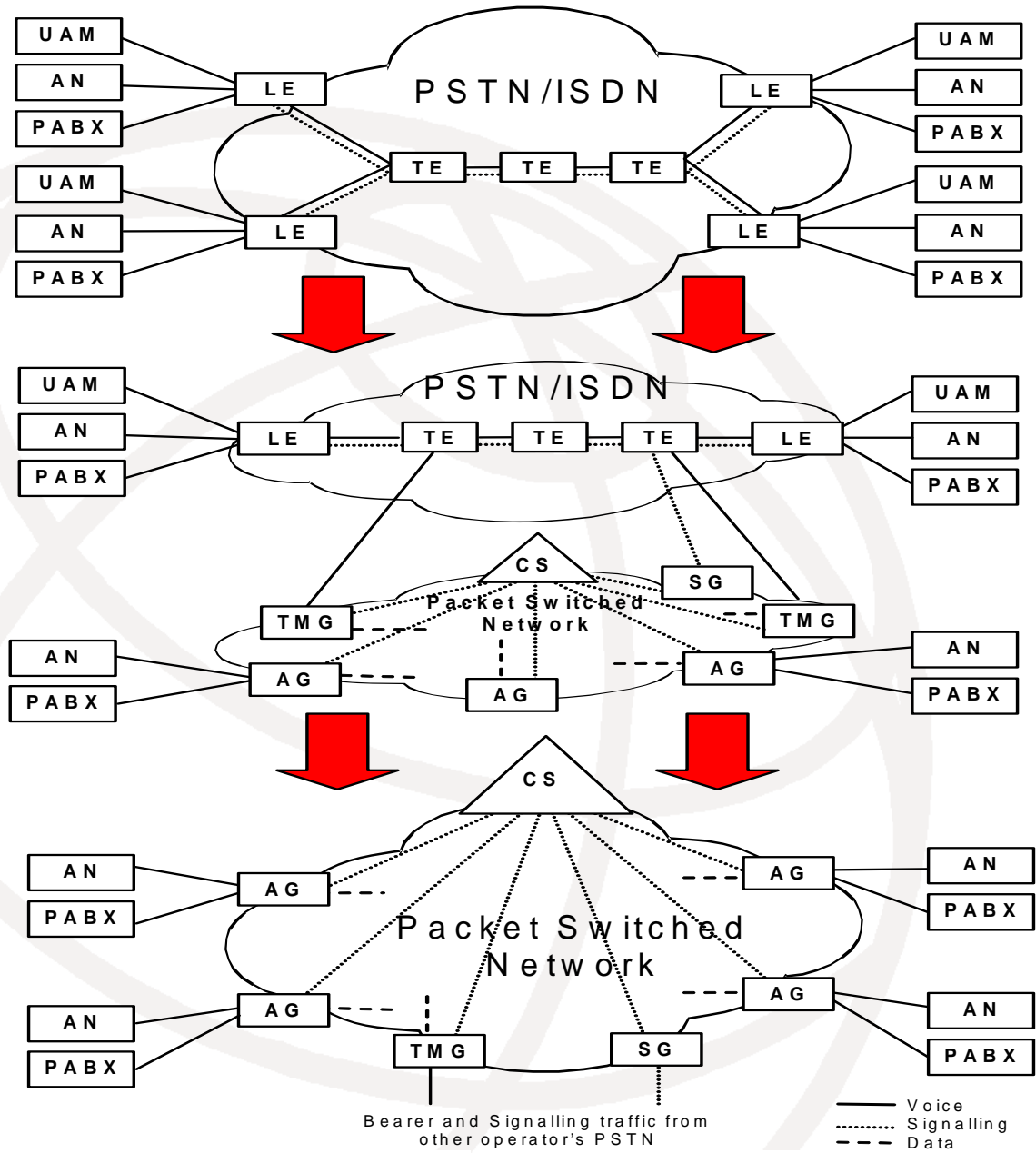
Scenario 1: Migration from LE

- **Step 1**
  - ➤ <u>Some</u> **of the LEs are replaced by Access Gateways (AG) controlled by a Call Server (CS).**
  - ➤ **Access elements originally connected to the removed LEs, are now directly connected to AGs : PABXs and Access Nodes (AN).**
  - ➤ **User Access Modules Functionality (UAM) assumed by AG and CS.**
  - ➤ **Trunking Media Gateways (TMG) and Signaling Gateways (SG) are deployed for <u>interconnection</u> between the PSN and the TEs of the legacy network as well as other operators' PSTNs/ISDNs.**
  - ➤ **AGs and TMGs are all controlled by the CS.**

- **Step 2**
  - ➤ <u>**Remaining**</u> **LEs are replaced by the AGs,**
  - ➤ <u>**Transit Exchanges (TE)s are removed**</u> **and their control functions are performed by CS.**
  - ➤ **TMGs and SGs are deployed for <u>interconnection</u> between PSN and other operators' PSTNs/ISDNs.**
 - ➤ **AGs and TMGs are all controlled by the CS.**

Scenario 2: Migration from TE

- **Step 1**
  - ➢ <u>All</u> TE functions are performed by the TMGs and the SGs under the control of the CS.
  - ➢ LEs are connected to the Packet Switched Network (PSN) via TMGs and SGs.
  - ➢ TMGs & SGs are deployed for interconnection between PSN and other operators' PSTNs/ISDNs.
 - ➢ AGs & TMGs are all controlled by CS.
- **Step 2**
  - ➢ <u>All</u> LEs are replaced by AG controlled by CS
  - ➢ Access elements originally connected to the removed LEs, are now directly connected to AGs : PABXs and Access Nodes (AN).
  - ➢ User Access Modules Functionality (UAM) assumed by AG and CS.
  - ➢ TMGs & SGs are deployed for interconnection between PSN and other operators' PSTNs/ISDNs.
 - ➢ AGs & TMGs are all controlled by CS.
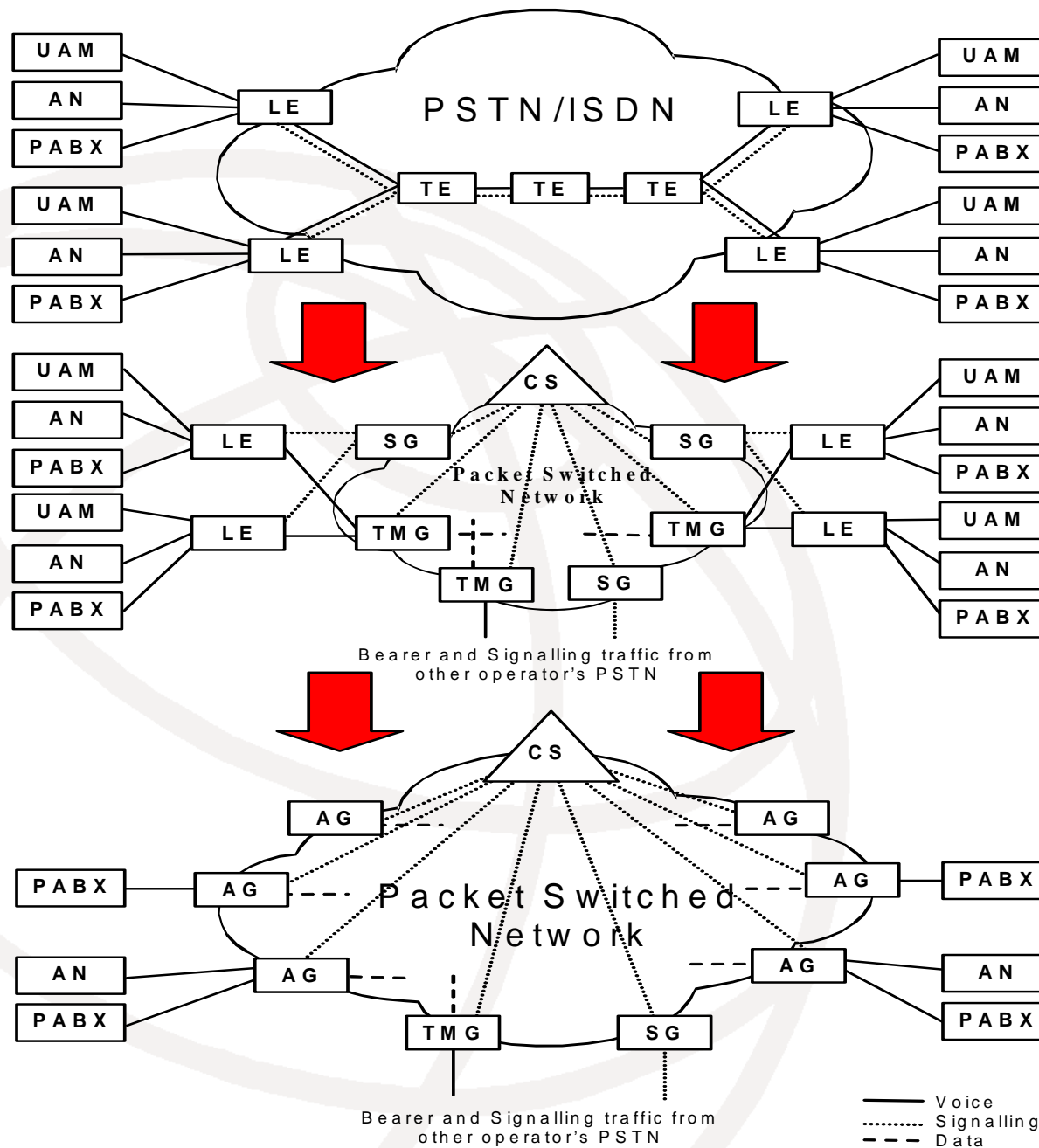
Scenario 3: One-Step Approach

- **LEs are replaced by the AGs and their functions are transferred to the AGs and the CS.**

- **All access elements such as user access modules (UAMs), remote user access modules (RUAMs), and private automatic branch exchanges (PABXs) are connected to access gateways (AGs).**

- **The access networks (ANs) are either replaced by the access gateways (AGs) or are connected to packet based network (PBN) through the AGs.**

- **Transit gateways (TMGs) under the control of the call server (CS), and the signalling gateways (SGs), are deployed to replace the TE functions and provide interconnection between PSN and other operators' PSTNs/ISDNs.**
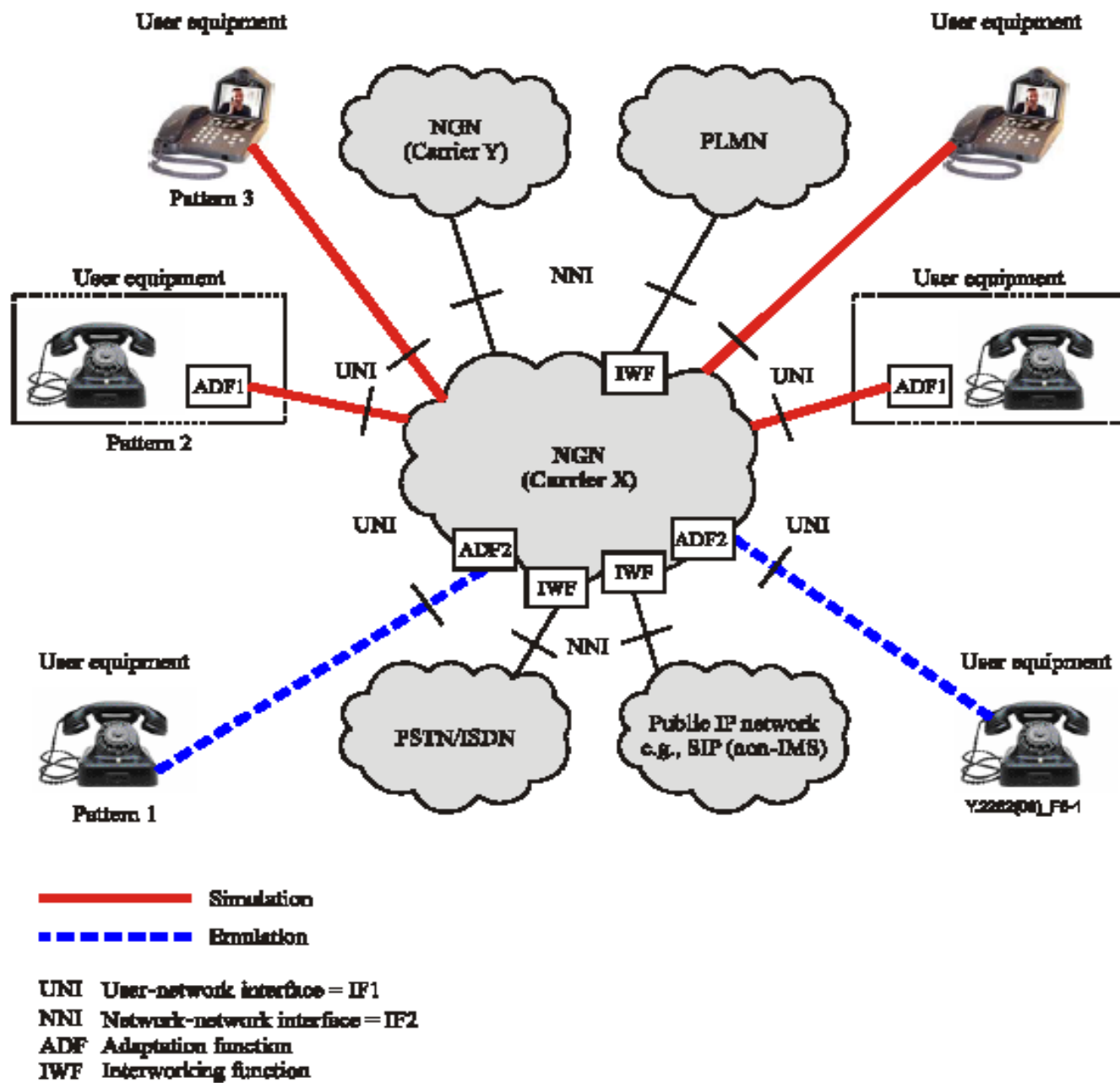
PSTN/ISDN

Packet Switched Network

Bearer and Signalling traffic from other operator's PSTN

Voice
Signalling
Data
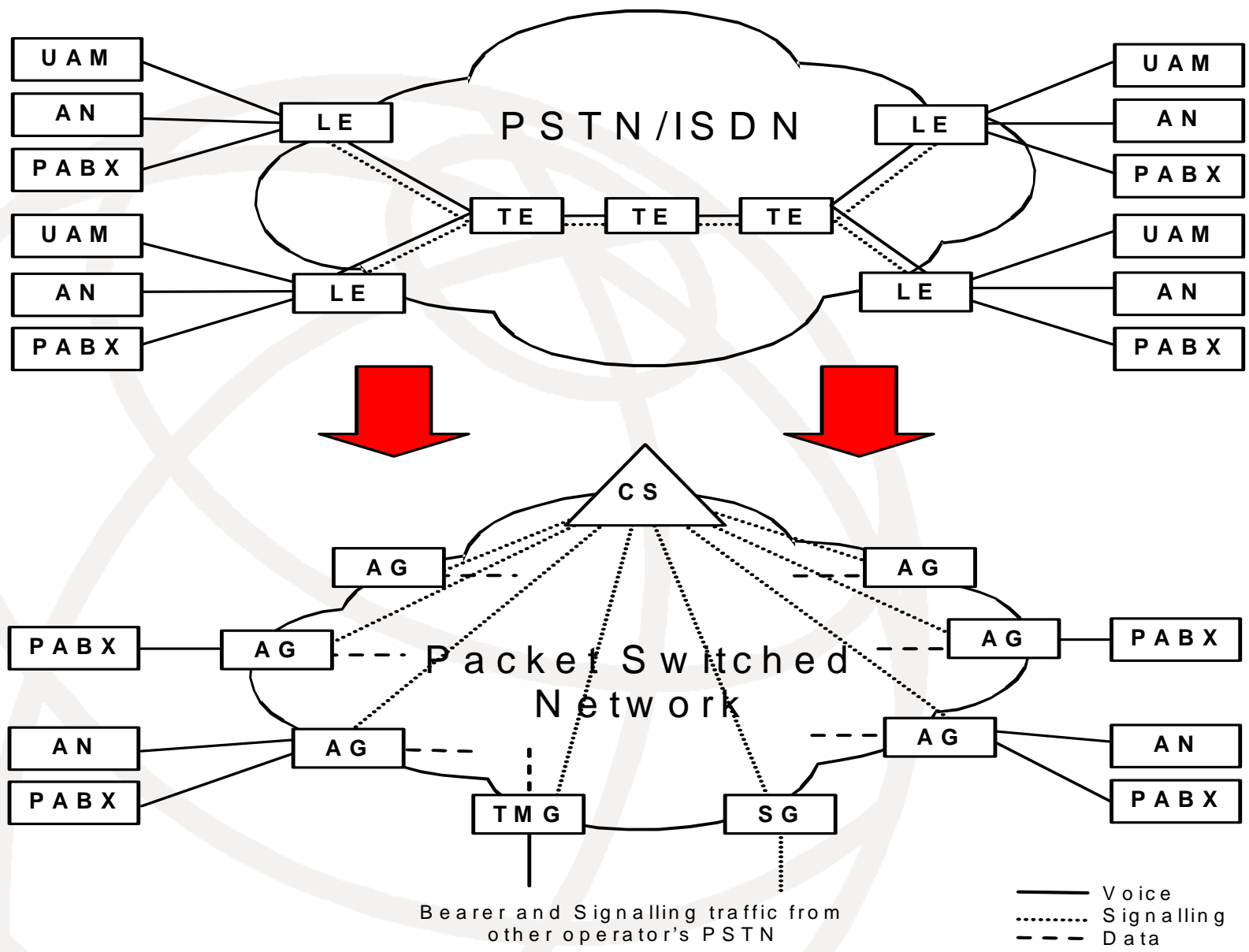
IMS-based evolution to NGN

- **PSTN/ISDN evolves directly to a PSN based on the IMS core network architecture.**

- **End-users access the network using NGN user equipment or legacy user equipment connected via an AG.**

- **Transit and signalling gateways (TMGs & SGs) are deployed for interconnection between the NGN and other operators' PSTNs/ISDNs.**

- *Concurrent* **CS-based and IMS-based evolution to NGN implementations can occur when an existing operator deploys a separate IMS-based network for** *new services* **and supports the remainder of the services using a CS-based approach.**

- **These two types of network implementations need to interoperate.**

- **Interoperation is possible if SIP is used, but this is beyond the scope of recommendation Y.2261.**

Voice ——— Signalling ·········· VoIP – – –
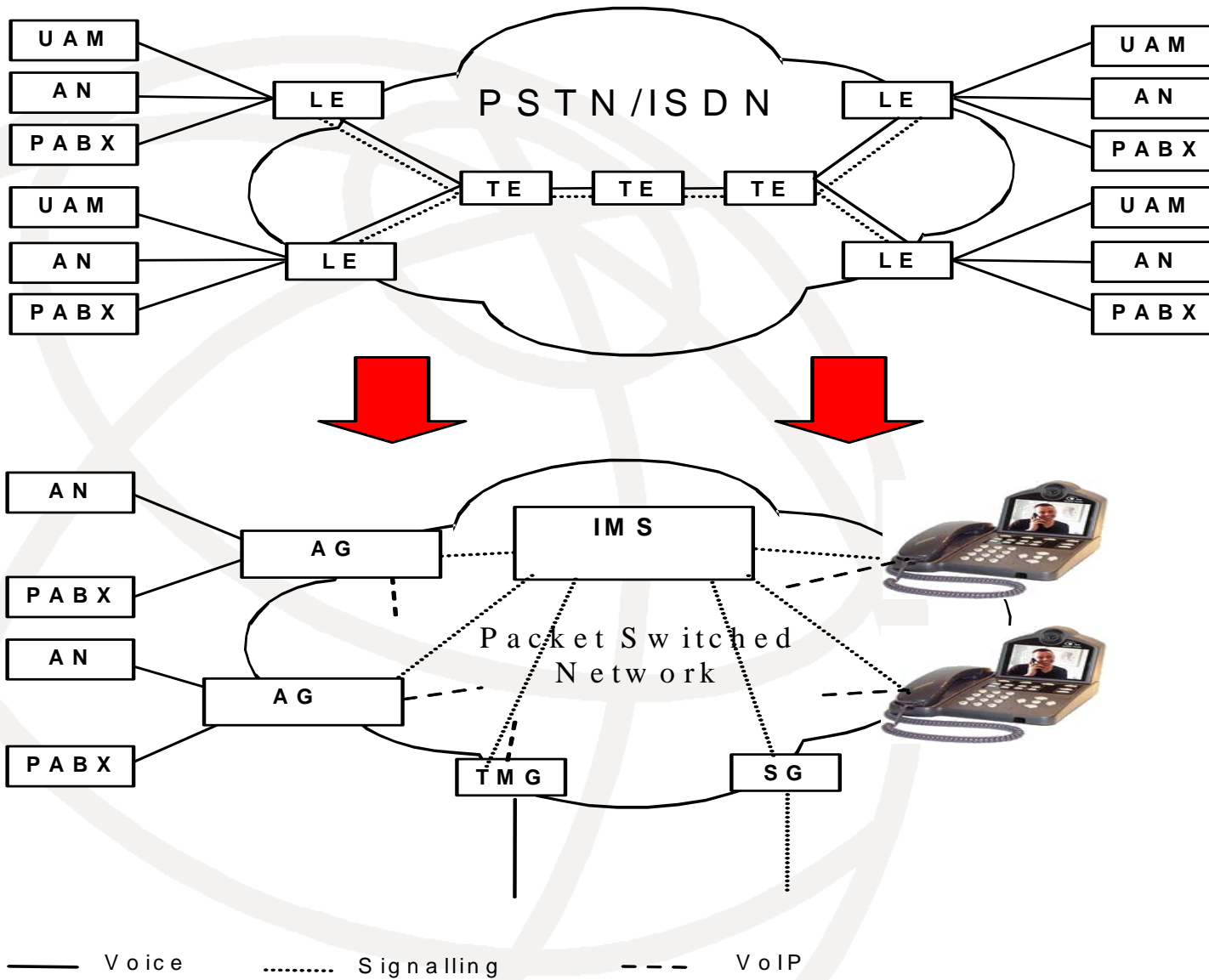
# What remains of the PSTN/ISDN services: Emulation or Simulation ?

- *Emulation* refers to the Provision of *most of* the existing PSTN/ISDN service capabilities and interfaces using adaptation to an IP infrastructure.
  - ➢ Only a *sub-set* of PSTN/ISDN could be supported.
- *Simulation* refers to the same service provision as above but there is *no guarantee* that all features are provided.
  - ➢ *New features and capabilities* may be provided with respect to legacy PSTN/ISDN.
- Specification Y.2262 specifies two types of adaptation functions (ADF) for legacy access equipment
  - ➢ ADF1 for simulation
  - ➢ ADF2 for emulation

Simulation

Emulation

UNI   User-network interface = IF1
NNI   Network-network interface = IF2
ADF   Adaptation function
IWF   Interworking function

Emulation is complex:
Call Server-based PSTN/ISDN Emulation Service (CS-PES) Components

- **Access Call Server (ACS)**
  - ➤ Controls Access Gateways (AG), subscriber registration and call control
- **Breakout Call Server (BCS)**
  - ➤ Controls Trunking Media Gateways (TMG)to interwork with PSTN/ISDN
- **IMS Call Server (ICS)**
  - ➤ Controls interconnection Border Gateway to interwork with Packet-based networks (NGN, IP Multimedia, Internet)
- **Gateway Call Server (GCS)**
  - ➤ Ensures interoperability between among CS-PESs to provide end-to-end services
- **Routing Call Server (RCS)**
  - ➤ Provides routing function between call servers

Emulation Call Server
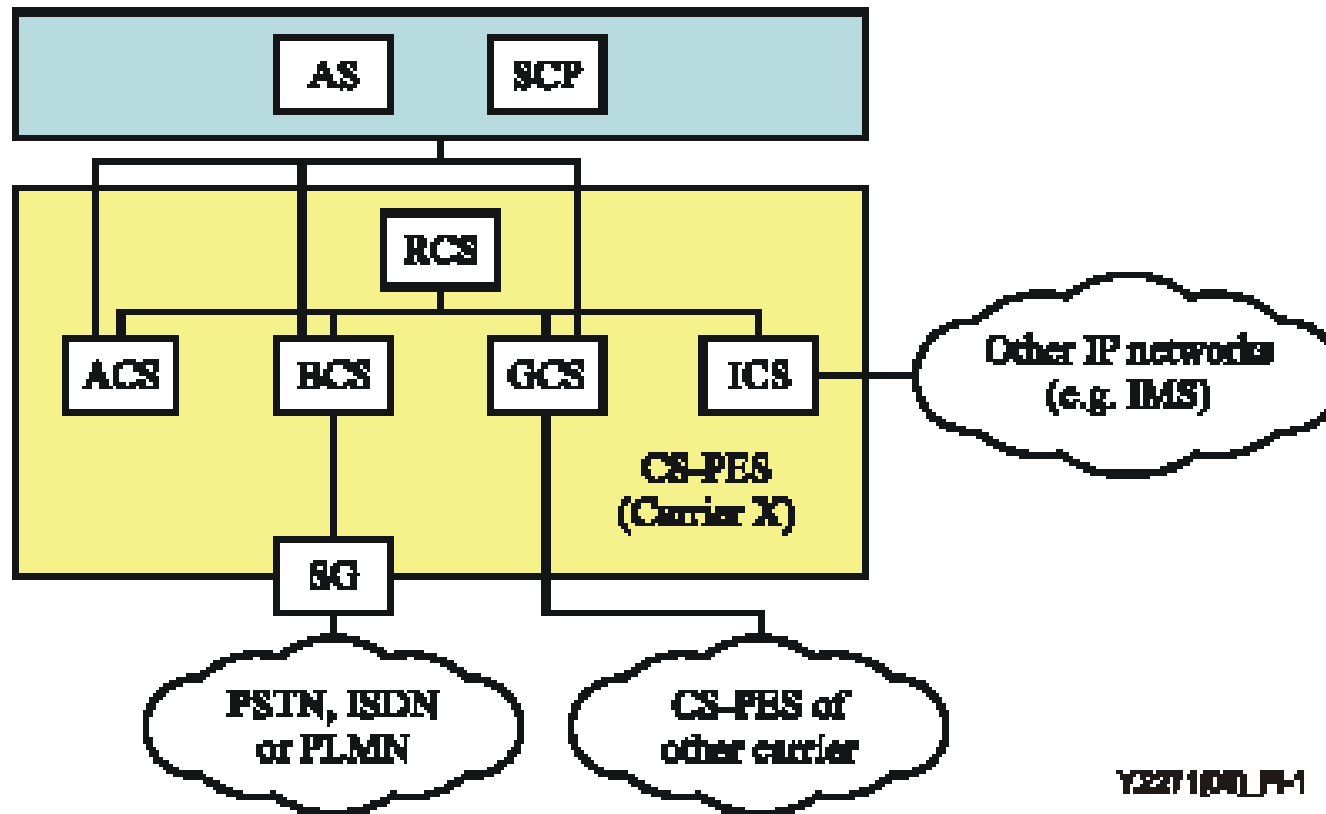
Concluding Remarks

- **Y.2261, Y.2262 and Y.2271 provides some functional guidelines for NGN migration with a focus on emulating existing PSTN/ISDN network**
  - ➤ Scenarios proposed well adapted to the context of legacy operator willing to move their services *as they exist* to NGN
  - ➤ But a bit less to new entrants: reality of NGN voice services by new entrants leans towards simulation rather than emulation
- **Developing countries must contribute more effectively to this standardization effort to take into account their specific conditions**
  - ➤ Legacy PSTN/ISDN infrastructure generally more modern than in developed countries but…
  - ➤ Growth needs more acute: grow with Emulation, Simulation or…leapfrog to IMS ?
- **The floor is yours: you must contribute !**

Thank you for your attention!

Questions ?

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