

Learning's from NGN Migration Study Group

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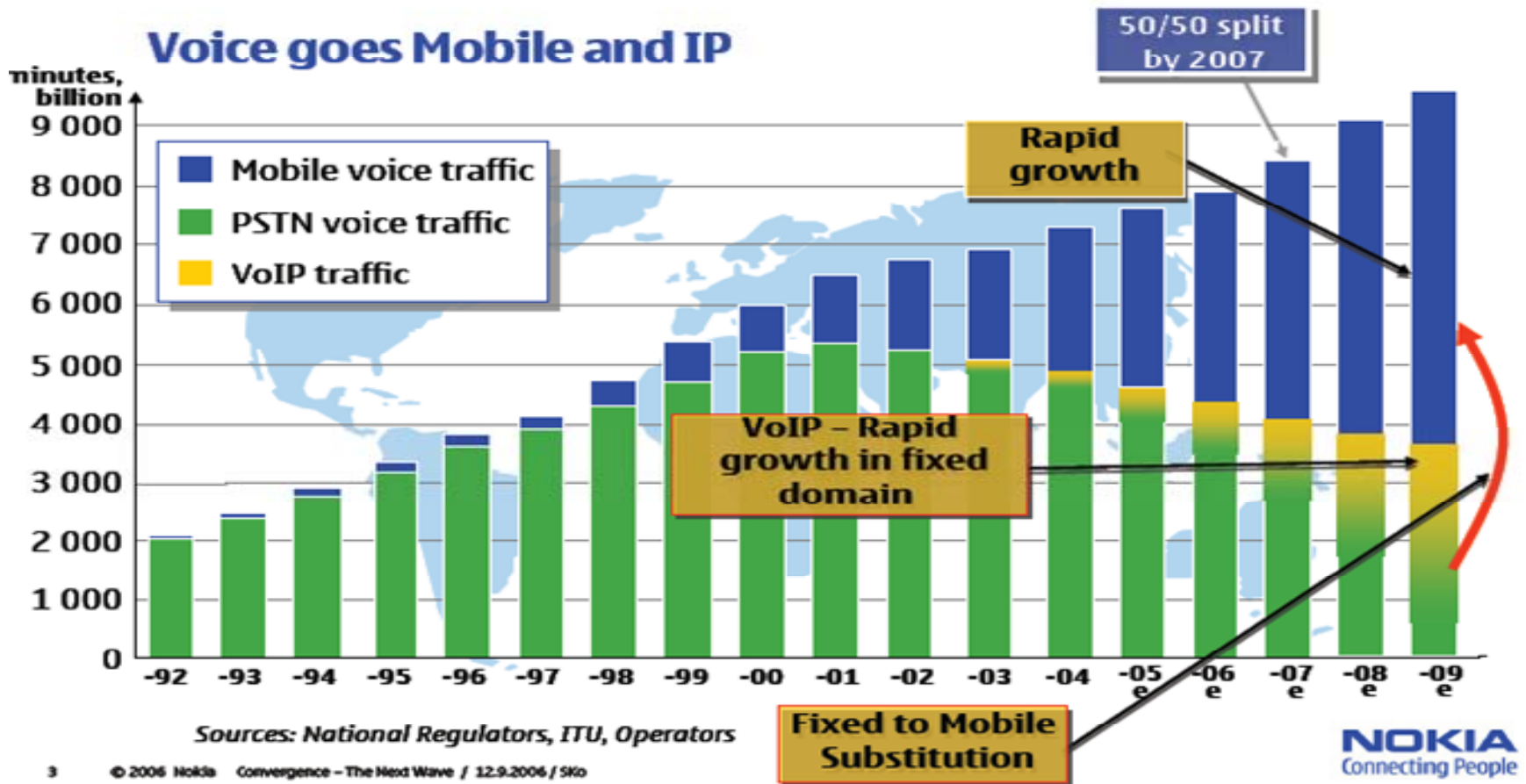
**To ignore the facts
does not change the
facts.**

In this session, I would try to cover....

- Why need migration?
- Ways for migration to NGN
- NGN technologies for support migration
- Migration scenarios
- Generic migration procedure
- Further work

Why need migration?

General Motivation for Migration- trend caused by the business flows



How to meet these trends?

- Compensate reduction of revenue
 - Cost reductions by sharing network infrastructure and systems
 - Reduction of network and service infrastructure deployment cost.
 - Reduced OPEX and enhancing streamline operations
 - Integrated platforms for provisioning of various types services and applications
 - Integrated operation platforms including integrated maintenance and training
 - Centralized Management and Control.
- Finding new revenue sources
 - providing commercial multimedia services in economic ways
 - Compensate voice revenue reduction and increase Broadband related businesses
 - Providing Service innovation (e.g. VPN)
 - Decreased time to market to introduce any new types of services and applications.

Why need migration?...

Operator's view for Migration

- Support of business continuity required to maintain ongoing dominant services and customers that require carrier-grade service
- Flexibility to incorporate existing new services and react quickly to the ones that appear on real time (well utilize main advantage of IP mode).
- Profitability to allow feasible return on investments and in the best practices market values.
- Survivability to allow service assurance in case of failures and external unexpected events.
- Quality of Service to guarantee the Service Level Agreements for different traffic mixes, conditions and overload.
- Interoperability across networks to allow to carry end to end services for flows in different network domains.

Technical view for Migration

- There are many of technical issues on the today's internet even use of IP technology which is used also in NGN.
- These technical issues caused certain difficulties to resolve requirements of network operators and service providers.
- More technical issues are coming from handling the media effectively such as IPTV.
- It is required to develop completely new technology or additional capabilities on top of current IP when IP use.

Why need migration?...

Technical issues

- Management- ----Scalability, billing
- QoS & security- ---Reliability, secure system
- Ubiquity-----Anytime, anywhere
- Content---- Digital Right management
- Network optimization ---- Simplified service deployment
- Interoperability
- Multitude of access network-----fixed ,mobile fibre...
- Shared resources--- shared voice and data resources
- Mixing of traditional and internet service
- Interactivity -----end to end interactivity
- Storage—data retention
- Standards Compliant--- implementing standards compliant device
(Y.2001 announced as one of the strongest candidate to solve many of these technical issues even not all of them)

Ways for migration to NGN

- ITU-T recommendation Y.2261 gives guidance when operator will build up a migration plan
- For migration of PSTN/ISDN to NGN, aspects identified:
 - Signaling and control
 - Management
 - Services

Signaling and control

- PSTN/ISDN uses signaling systems such as analogue line signaling, channel associated signaling (CAS) and common channel signaling (CCS), like SS7 or DSS1 [Q.931]
- Since NGN transport is packet-based (and call and bearer are decoupled), other suitable types of signaling (e.g., BICC, SIP-I [Q.1912.5], etc.) may be required.
- The signaling function and call control function may reside in more than one NGN element.
- Since the NGN has to work with the PSTN/ISDN and other networks, interworking between NGN signaling systems and the legacy network signaling systems is required.
- Signaling aspects within the next generation corporate network shall remain independent from NGN access or core network signaling.
- Signaling aspects for access and core networks be independent in order to provide the possibility for a step-wise approach for migration to NGN.

Management

An NGN management system is comprised of three planes

- network management plane,
- the network control plane
- service management plane.

Migration of PSTN/ISDN management (i.e., operations, administration and management) systems requires the ability to support the transition of PSTN/ISDN through intermediate stages towards NGN.

Services

- PSTN/ISDN services which are traditionally provided by PSTN/ISDN exchanges may be provided by application servers (ASs) in NGN.
- some or all of the legacy services require to be provided by NGN.
- Use of legacy terminals via adaptation to the NGN is expected in order to support existing services.
- continuity of bearer services should be provided.
- NGN should provide same or better QoS for PSTN/ISDN bearer services.
- PSTN/ISDN simulation provides functionality that is similar but not identical to existing N-ISDN bearer services.
- PSTN/ISDN emulation shall be capable of providing all bearer services offered by PSTN/ISDN.

Services...

- Continuity of supplementary services should be provided to the extent practical.
- Naming, numbering and addressing:
 - The NGN naming, numbering and addressing schemes, in accordance with ITU-T Recommendation Y.2001 shall be able to inter-work with the existing E.164 numbering scheme.
 - During PSTN/ISDN migration to NGN process, it should be ensured that the sovereignty of ITU Member States, with regard to country code numbering, naming, addressing and identification plans, is fully maintained.
 - As a minimum, support should exist for Internet IP addressing schemes including E.164 Telephone uniform resource identifiers (TEL URIs), e.g., tel: +98 765 4321 and/or SIP Uniform Resource Identifiers (SIP URIs), e.g., sip:my.name@company.org.

Services...

- Accounting, charging and billing:
 - During the transition period, maintaining the existing accounting, charging and billing procedures, to the extent practical, may be required
 - Migration from existing networks to NGN will also imply replacement of the existing sources of the accounting data generation. The NGN shall support both offline and online charging
- Inter-working
 - Ability to interwork with IMS-based or non-IMS-based networks such as other PSTN/ISDN, public IP networks (e.g., NGN, Internet)
 - Ability for inter-domain, inter-area or internetwork interworking
 - Support for authentication and authorization
 - Ability to perform call admission control
 - Capability to support network performance parameters as defined in [Y.1541]
 - Support for accounting, charging and billing

Services...

- Call routing
 - NGN coexists with PSTN/ISDN, the routing scheme should allow the carriers to control where their traffic enters and leaves the NGN
 - To make it possible for the carrier to optimize use of their network resources and to avoid multiple points of interworking between NGN and PSTN/ISDN along the media path.
- Service requirements by national regulatory bodies
 - The basic telephone service with the same or better quality and availability as the existing PSTN/ISDN
 - Capability for accurate charging and accounting
 - Capabilities to support number portability
 - Availability of a directory inquiry service for PSTN/ISDN and the NGN users;
 - Support of emergency telecommunications
 - Mechanisms to support lawful interception
 - Interoperability between an NGN and other networks e.g., PSTN/ISDN and PLMN.

NGN Technologies for support migration

Emulation

Supports provision of PSTN/ISDN service capabilities and interfaces using adaptation to an NGN infrastructure using IP

Simulation

Supports provision of PSTN/ISDN-like service capabilities using session control over IP interfaces and infrastructure

Emulation Scenario

Provides "Adaptation Function (ADF)" legacy terminal devices such as black phone connects to the NGN and uses their services with:

- An encapsulation process.
- All services available to PSTN/ISDN users.
- User experience not changed by the network transformation.

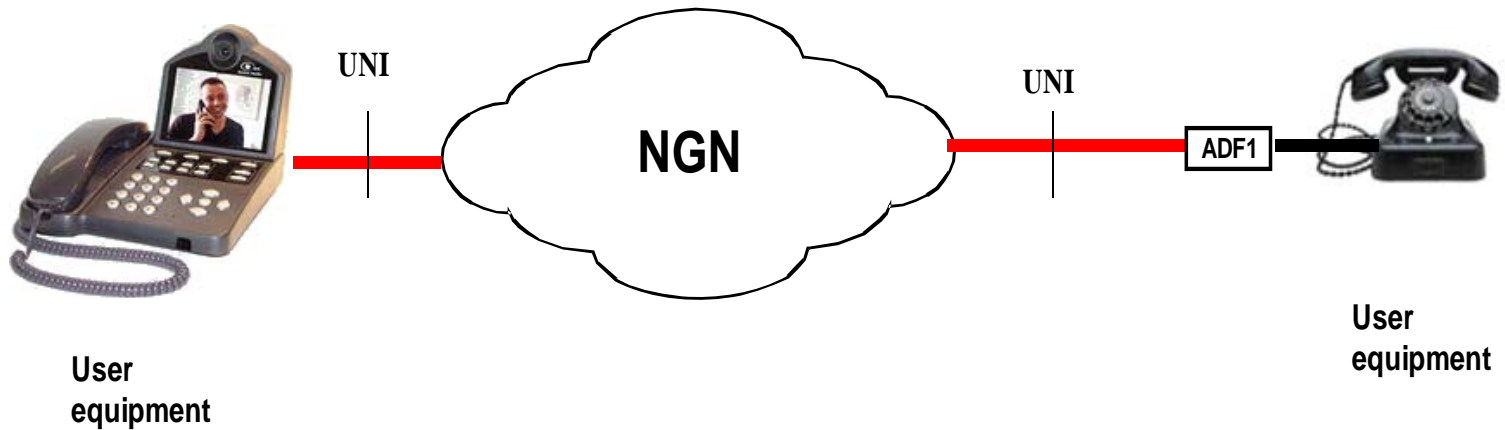
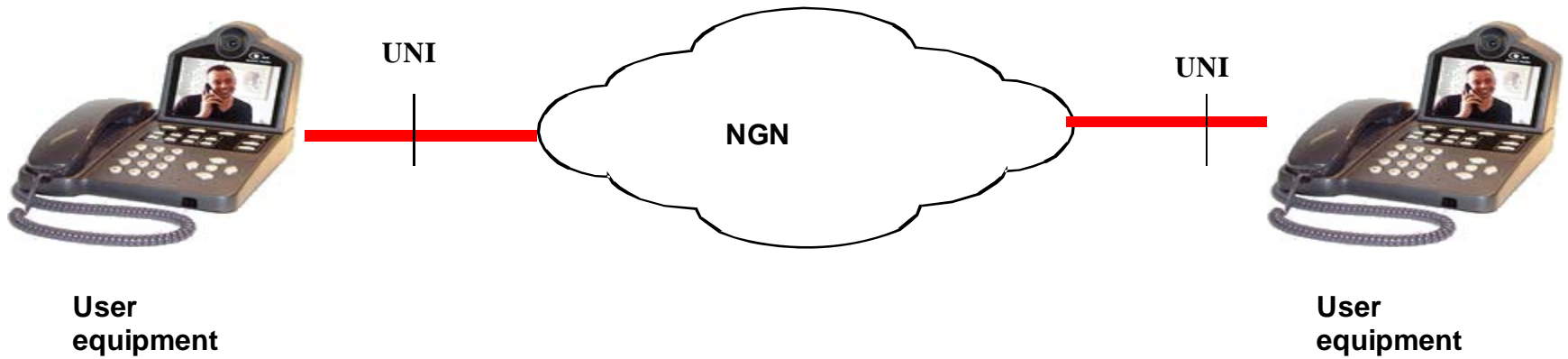


Simulation Scenario

- Simulation is for providing PSTN/ISDN like service to the NGN users.
- NGN users will communicate with PSTN/ISDN users using this simulation capability.
- Key features of NGN Simulation
 - PSTN/ISDN-like services available
 - Availability of possible new services
 - User experience is changed by the network transformation.

NGN Technology for support migration..

NGN Simulation Scenarios of PSTN/ISDN

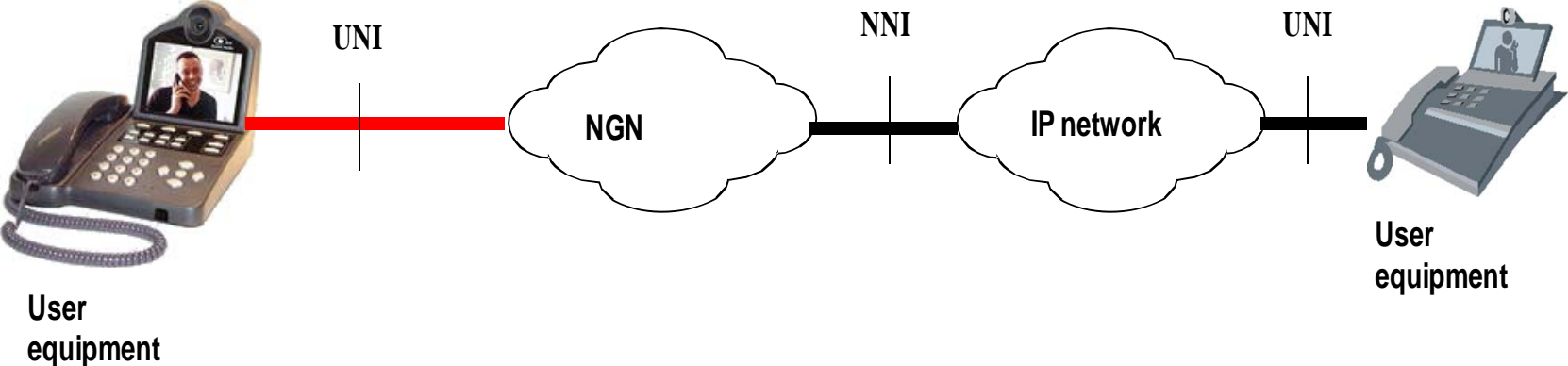
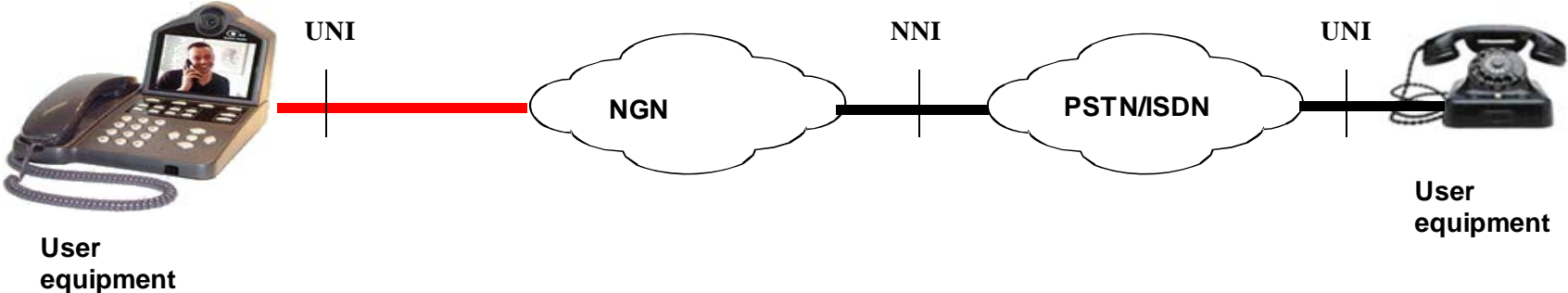


NGN Technology for support migration

Interworking using Emulation and Simulation

- Taking into consideration the importance of voice services, NGN voice oriented services should be linked with voice services in PSTN/ISDN environment.
- To support of this requirement, emulation and simulation jointly are used for interworking between NGN and legacy networks such as PSTN/ISDN.
- It will be decided according to the interworking situation which technology would be used in which area.
- Simulation is used in NGN side while interworking with legacy side is using emulation. Service features in this case are characterized as :
 - Service interworking between NGN and PSTN/ISDN is required
 - Only PSTN/ISDN-like services available
 - Legacy terminal user experience cannot be fulfilled for end-to-end connection

Interworking between NGN Emulation and Simulation

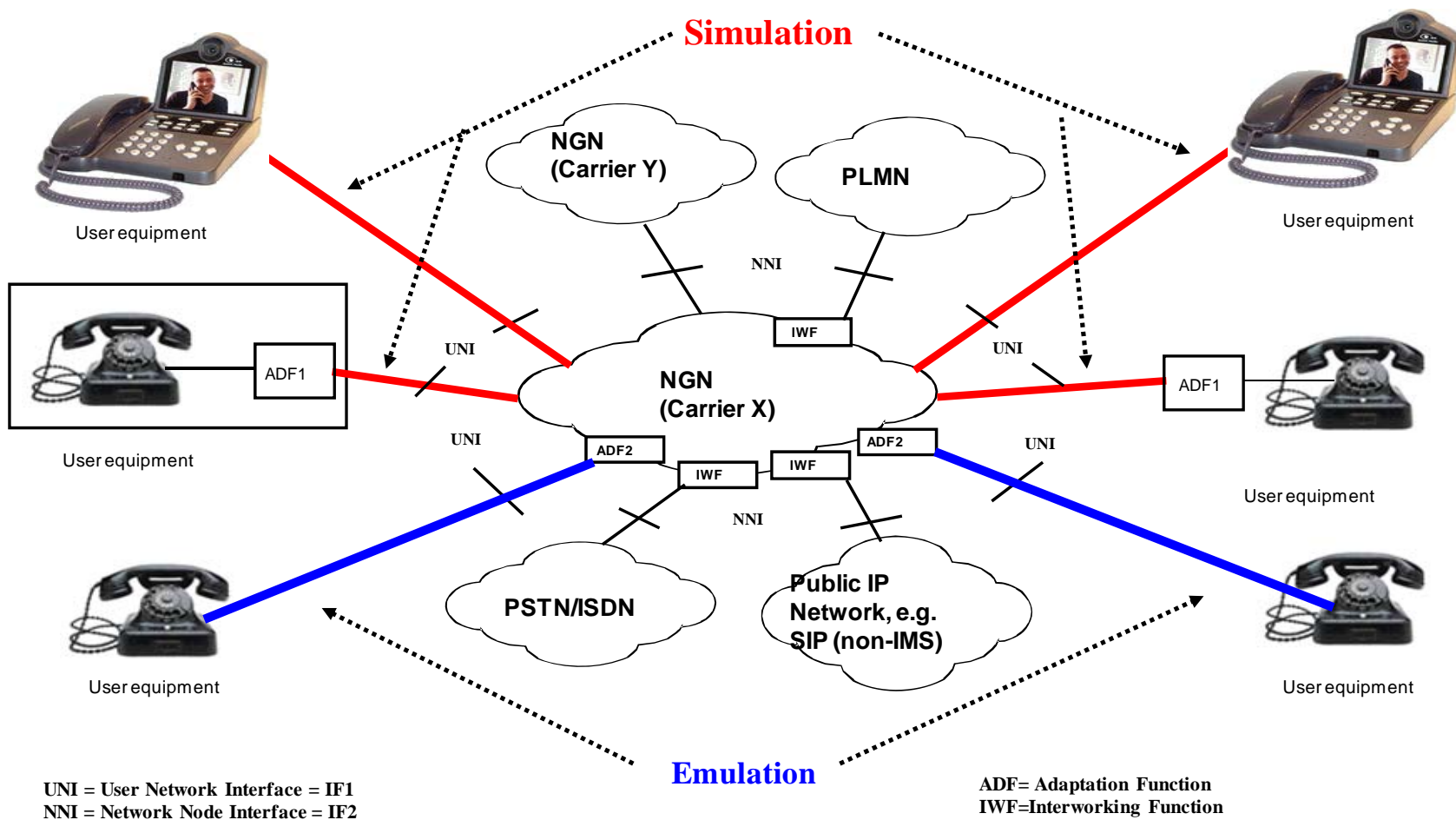


NGN Technology for support migration

Overall configuration of using Emulation and Simulation

- Key requirement of Emulation and Simulation technology is supporting voice oriented services.
- PSTN/ISDN is a major network infrastructure today to support voice services including various supplement services especially in case of ISDN.
- In addition, there are continuously increasing end users of using voice services over legacy IP environment.
- Therefore NGN should support its voice related capabilities such as emulation and simulation to cover PSTN/ISDN and legacy IP based networks.
- Combination of these capabilities with proper interworking scenarios will help to support end user voice service requirements in the cases of end user device connected to fixed, mobile and legacy IP based to cover voice services wherever end user places.

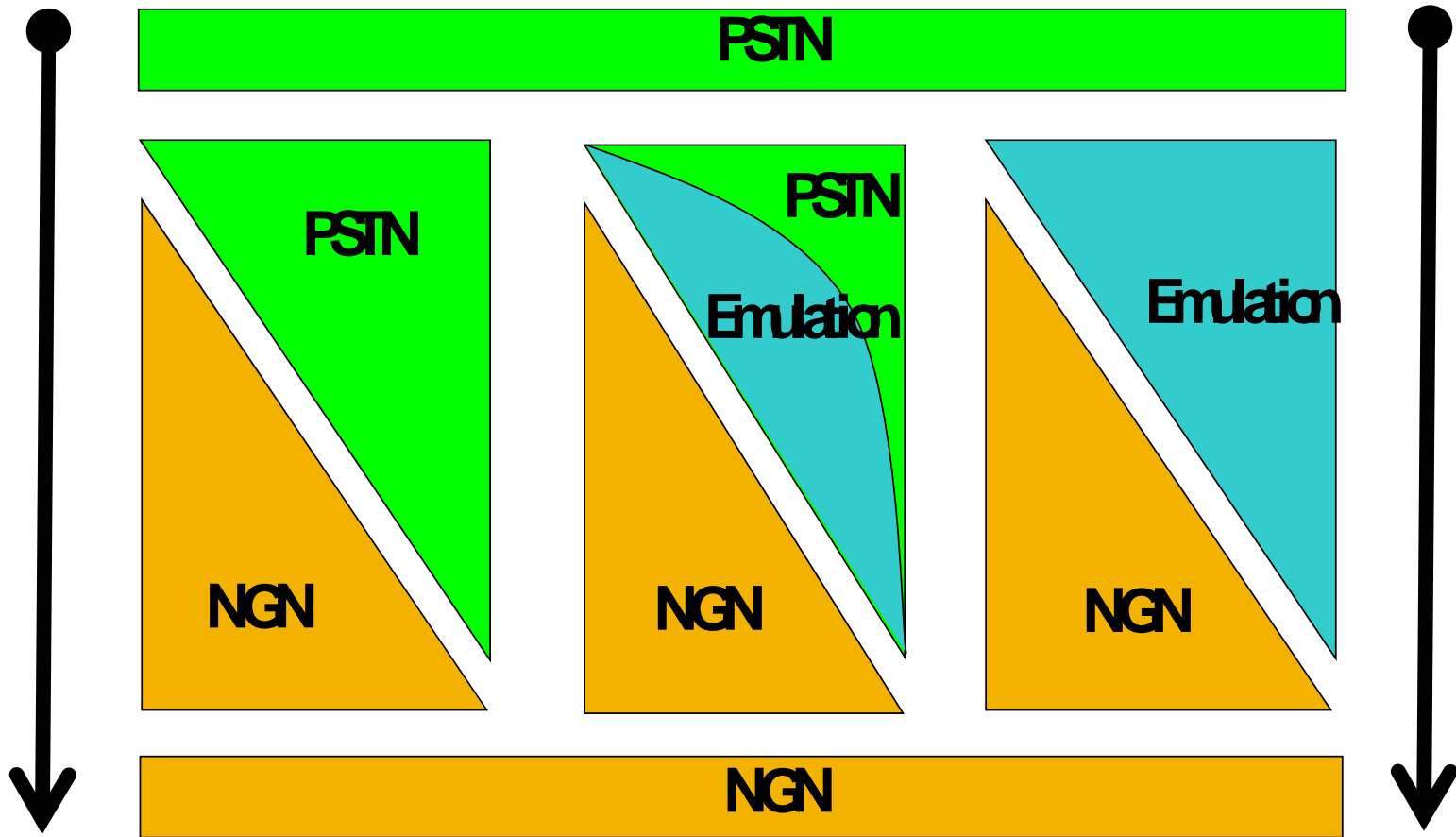
Overall view of using NGN Emulation and Simulation



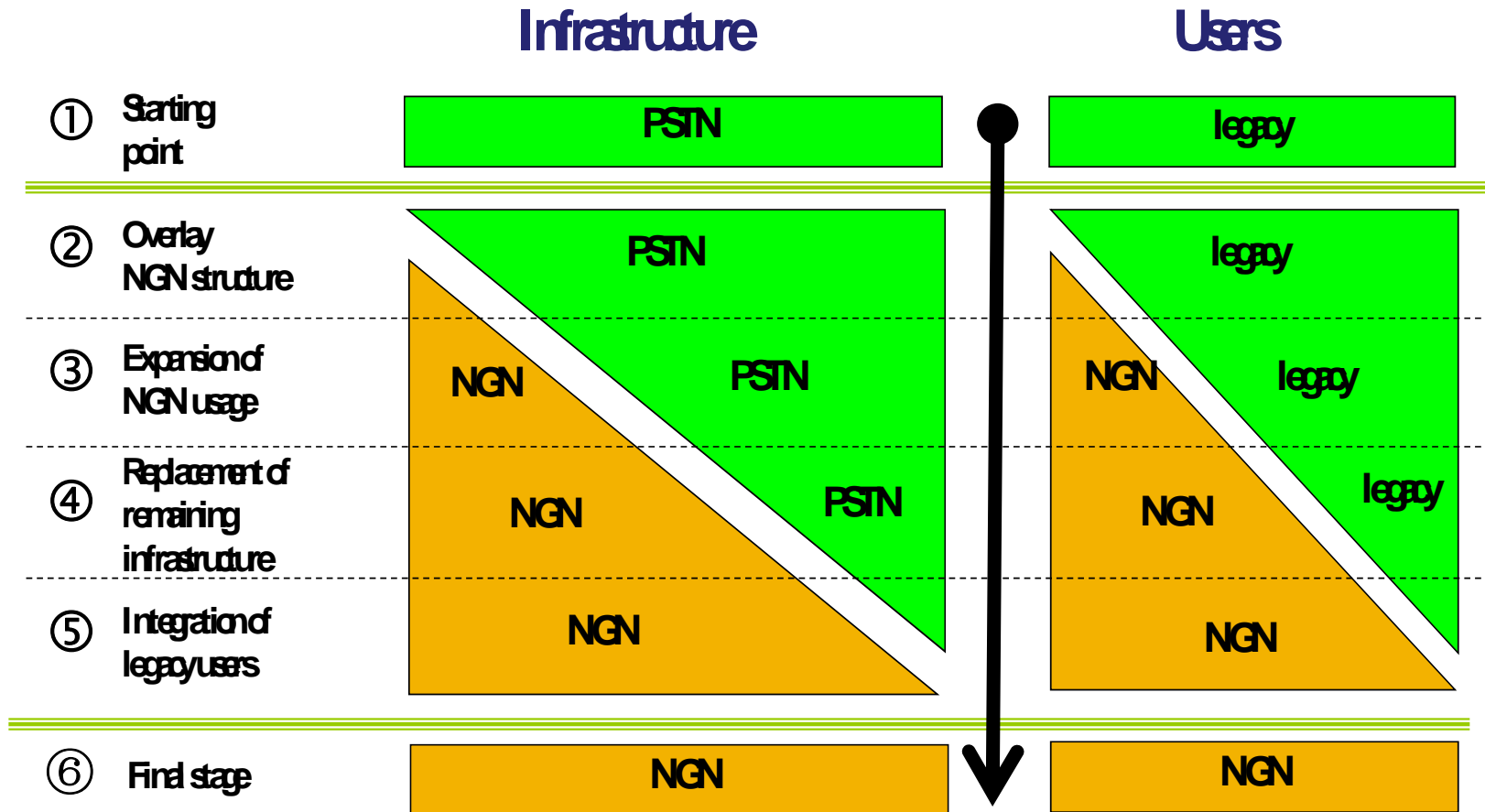
Migration Scenarios

- Using emulation and/or simulation of NGN, there are various ways of migration from legacy network to NGN. This should be decided according to the each country or provider situation
- Three different types of migration scenarios are introduced as a framework consideration but other possibility should not be limited
 - Overall migration scenarios
 - Overlay migration scenario
 - Infrastructure replacement migration scenario

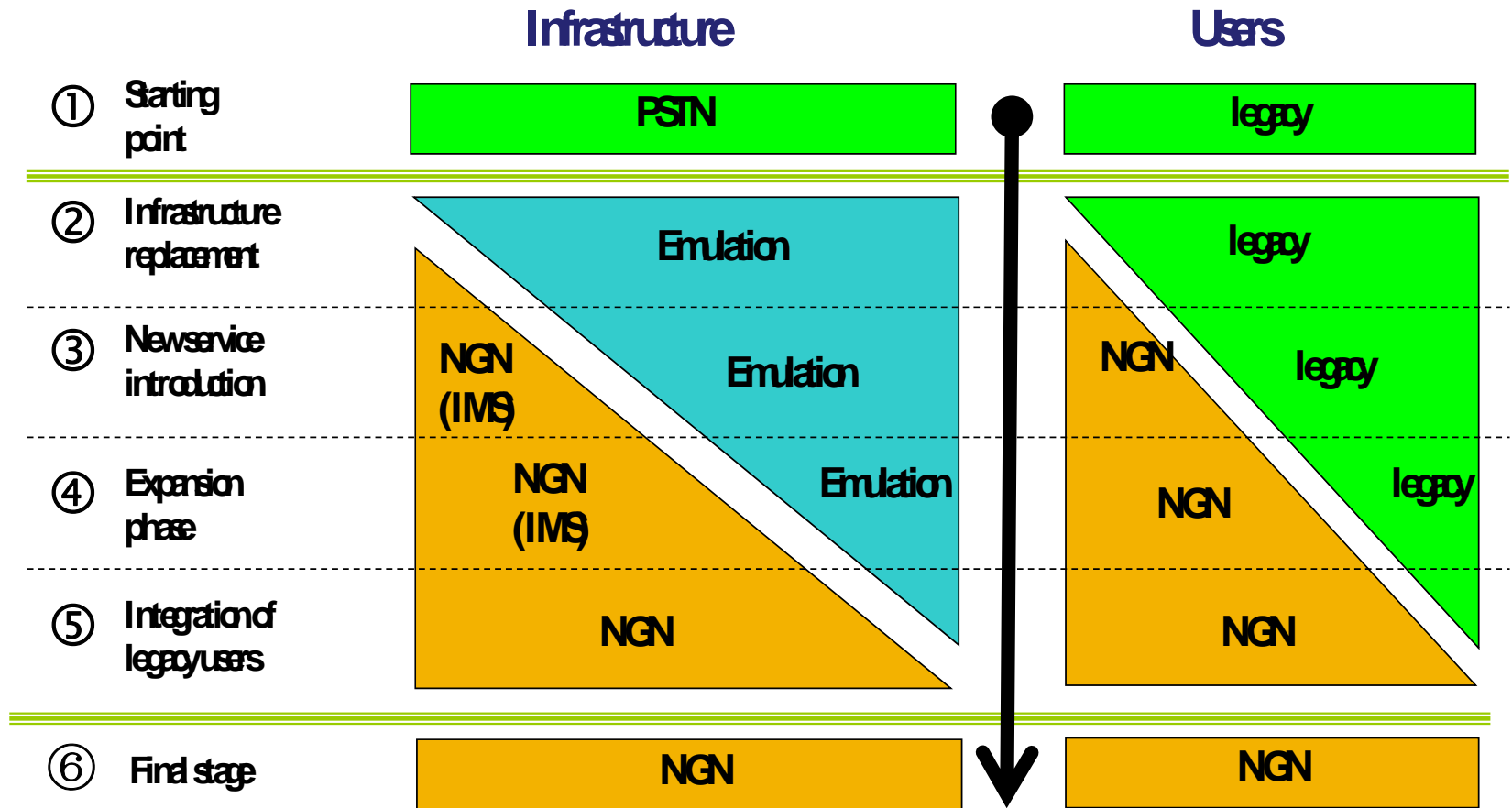
Overall migration scenarios



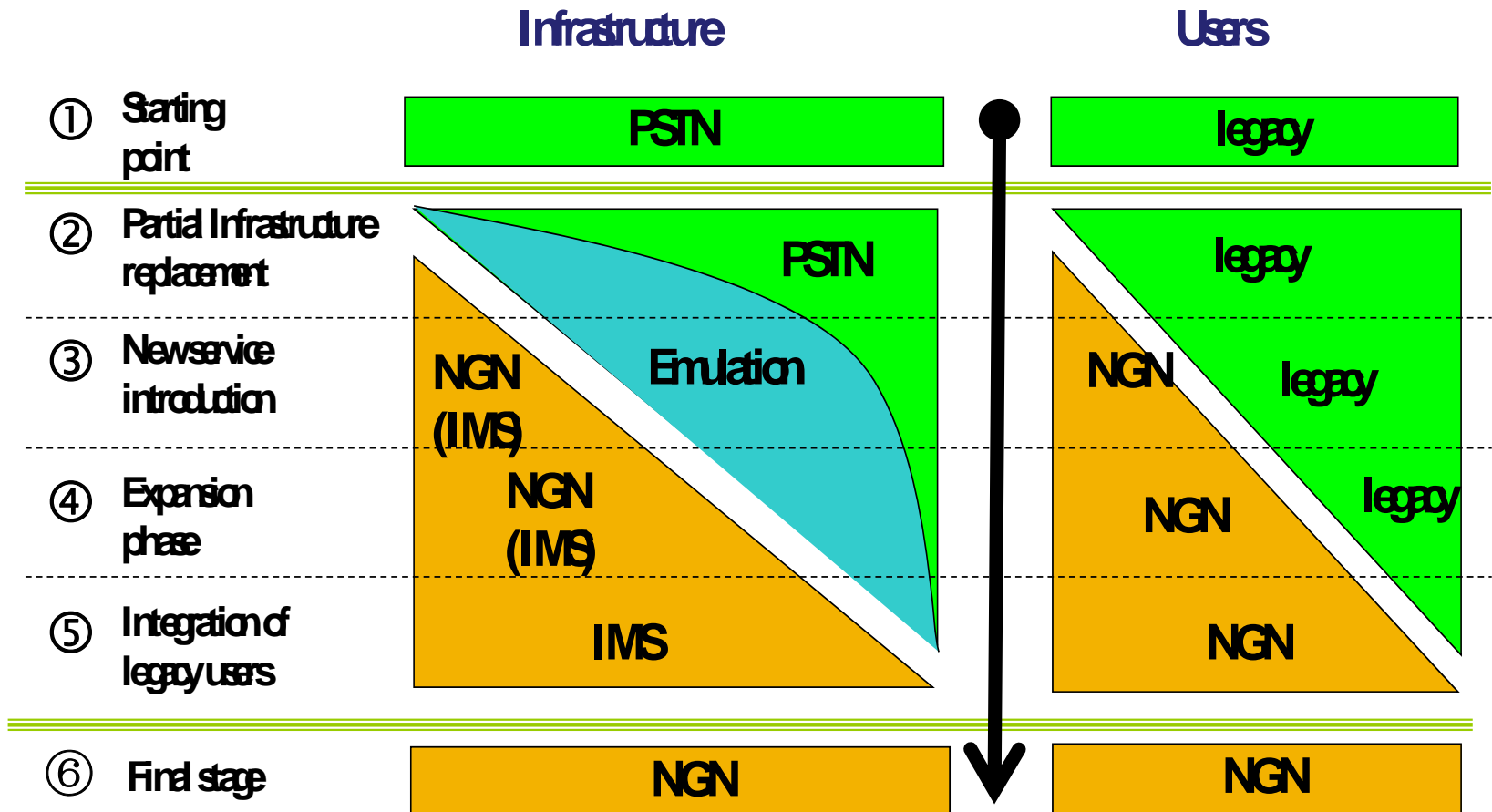
An overlay migration scenario



An Infrastructure replacement migration scenario



Mixed migration scenario



Generic Migration Procedure

- Migration from one to other is not an easy or simple task
- Migration of network infrastructure need very careful plan and examine various aspects.
- There is no single way or the best way for the migration to NGN, because migration should be based on each country situation as well as each operator given condition.

Generic Migration Procedure

Recommendation

- Provision of new communication services to broadband users in addition to existing network
- A significant portion of users switches to those services. Reduction of true PSTN/ISDN usage visible
- Cost of maintaining both systems in parallel becomes a factor, **Decision to begin replacement of infrastructure**
- Replacement of part of the infrastructure (e.g. local switch) by new infrastructure, **without forcing all users to migrate**
- Full change to new infrastructure
- Migrate remaining users to NGN
- Taking consideration of possession portions between "Access Network domain" and "Core Network domain" of each country, migration procedure should be applied to one of such domains first.
- It is general understanding that it is easier to set up migration plan for "Core Network domain"
- Core migration will have less impact on the service provision rather than "Access Network domain." migration.

Recommendations...

Access Network Domain

- Has quite complicated situations not only for technical aspects but also geographical differences, it is not recommended to choose one specific technology to replace any legacy access network systems.
- It is rather recommended to consider harmonization among different technologies to cover customer requests in more flexible and economical way
- Many of different access technologies are developed using fixed and mobile with supporting broadband connectivity. And most of technology also provides IP connectivity which is the critical technical feature to meet NGN requirements (e.g. Packet based transfer).

Recommendations...

- In case of **fixed based access networks**
 - xDSL technology is mainly used to provide broadband today.
 - The final goal in the fixed network will be to deploy fiber based infrastructure.
 - xDSL gives the possibility to utilize existing copper based access infrastructure as much as possible for deploying broadband infrastructure in economic way, but with limited capacity (below 10 Mbps).
 - Fiber optics is a kind of target technology in the area of fixed networks with its unlimited capacity not only for core networks but also access networks including home network as well. Only concerns are related to the cost and construction difficulties.
 - Both concerns will be faced by the quick development of the technology. Therefore it is recommended to use both xDSL and Fiber together in the access network as a preparation of migration to NGN including preparation of enough broadband capability.

Recommendations...

- In case of **mobile (including wireless such as WiFi and Wi-MAX)**
 - This is also very important because many of people, especially in developing regions, uses mobile phone for their life communication and mobile will provide mobility to the people
 - There are many technologies to provide broadband capability in mobile access networks including IP connectivity but still has certain limits on the providing bandwidth (around 10 Mbps)
 - Standard organizations are working hard to develop technologies for better bandwidth but will take a time.

Further work

- A vast majority of developing countries are aware of NGN migration and the challenge it raises;
- Many countries already introduced some components of NGN architecture within their networks like VoIP with soft switches or the introduction of national IP backbones; some have even migrated a significant part of their legacy voice architecture to NGN;
- Still, what characterizes many developing countries is the lack of Broadband access – especially in its wireline form (DSL, Fiber, ...) – with respect to developed countries;
- Lack of Broadband access result in marginal if inexistent use of new NGN services – like IPTV and multimedia communication – in many developing countries;
- Many developing countries also view the new NGN architecture as being complex with competing standard bodies (3GPP, TISPAN, ITU, ...) and fear that this architecture would have a heavy cost in terms of investments and expertise with no clear returns.

Thank you