ITU WORKSHOP ON

NUMBERING PLANNING AND CONVERGENCE ISSUES

Séminaire sur les systèmes de numérotation et leurs convergences

Accra Ghana; 28th – 30th April 2010

SESSION 4

Regulatory framework and management of the numbering plan

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PART 1: Introduction to Numbering Systems and Trends

- Introduction of Numbering Systems
- Brief History of Numbering Plans
- Applicable Definitions
- The Role of Numbering Systems
- Numbering Scarcity
- Conclusion

1.0: Numbering Systems

- **Numbering Systems** are defined by:
  - **numbering plans** *(the rules for formatting and allocating numbers);* and
  - **dialling plans** *(the rules for using numbers to make calls);*

All together determine the user-friendliness of a given system.

2.0: History of Numbering Plans

- The origin of Numbering Standardization
  - In 1964, the International Numbering Plan that governs the Country Codes, Area Codes & Local Numbering System was defined by International Telecommunication Union (ITU) through its Recommendation E.163.
  - The Rec. E.163 was later reviewed (1991)and is now knows as **E.164** for the same functions.
- The world trend in the Telecommunications sector
  - Between 1990 – 2000 the world witnessed unparalleled (Fixed/Mobile) growth
  - Development in wireless technologies accelerated:
    - Fixed and Mobile telecommunications networks deployments
    - Internet and Value Added Services (VAS) provisioning

3.0: Applicable Definitions (1)

In all talks of Numbering Systems the following Definitions are never left out

- **A Number**
  - *Is a series of decimal digits that contains information necessary to route the call to a uniquely identified termination point.*
  - *Can also be defined as a string of digits that uniquely indicate a network termination Point.*
- **Number Prefix**
  - *Defined as a number indicator for selection of different number format (e.g. ISD, TRUNK, etc).*

Applicable Definitions (2)

- **International Trunk Prefix**
  - *A digit or combination of digits to provide access to the international automatic outgoing trunk equipment (e.g. "00", "000", etc).*
- **National Trunk Prefix**
  - *A digit or combination of digits to provide access to the national automatic outgoing trunk equipment (e.g. "0").*
- **Trunk Code**
  - *A digit or combination of digits, not including the national (trunk) prefix, identifying the numbering area within a country (e.g. Accra =21; but NOT 021).*
- **Country Code**
  - *The combination of one, two or three digits identifying a specific country (e.g. 233 for Ghana, 255 for Tanzania).*

Applicable Definitions (3)

♣ Subscriber Trunk Dialing

– *A digit or combination of digits to be dialled in the national calls before the called subscriber's number to obtain a subscriber in another numbering area {e.g. (031 + SN) for calling Sekondi from Accra}.*

♣ Geographic Number

– *Is a telephone number associated with a country, as well as geographic location within that country. When someone dials a geographic number, the call is transferred to the subscriber's telephone set, with respect to that particular area.*

♣ Non Geographic Number

– *A non-geographic number, also called a virtual number, is a telephone number associated with a country, but not to any single geographic location within that country. When someone dials a non-geographic number, the call is automatically transferred to the subscriber's telephone set, wherever that set is located.*

Applicable Definitions (4)

- **Subscriber Number (SN)**
  - *Defined as a string of digits that identifies subscriber's or User's terminal in a network or numbering area.*

- **National Destination Code (NDC):**
  - *Defined as Nationally optional code in ITU-T Recommendation E.164 that constitutes Network and/or Trunk selection function.*

4.0 The Role of Numbering systems

- **The Numbering systems provide:**
  - Unique identification of a service
  - Unique identification of a Network
- **And also:**
  - Enables communications
  - Makes services available to the whole community of subscribers
  - Used by network operators for Routing & Charging.

5.0 Numbering scarcity

As a result of fast growing communications sector:

- Within recognisable ranges numbers can be scarce.

  - Though Numbering range can be added to, but may …
    - » Results in disruption and is costly to implement

♣ Hence, need for proper planning

6.0 Reasoning for Numbering Plans

Now being a scarce resource, there is a need for:

- ♣♣♣ efficient usage.
- ♣♣ provisions on new and future services.
- ♣ standardized formats to differentiate Operators, services, network types and users.

7.0: In Summary ……..

- Numbers are a scarce resource and need to be adequately planned and managed.
- Numbers enable communications between networks and hence subscribers.
- The technological advancements and Trends have increased the demand of numbering resources and hence challenges in assignments/allocations.

Further Readings & Acknowledgement


PNG NP


Policies


UK History

- www.icc-uk.com and www.itu.int

PART 2: Principles of Numbering Plans

- Drivers of Numbering Plan
- Principles of Numbering Planning
- Components of Numbering Planning
- Options for Numbering Plans
- Numbering Plan Formats
- Designing a Numbering Plan
- Session Conclusion

1.0: Drivers of Numbering Plans

- **Historical Issues include:**
  - *Plan originated from monopoly operator*
  - *Conformity to new developed formats*
  - *Political drive*
  - *Existing plan nearing exhaustion*
- **Technological issues include:**
  - *New products (e.g. IN services, VAS, VoIP)*
  - *Personal numbering*
  - *Corporate numbering*
  - *Virtual fax services*
- **Market liberalization:**
  - *Increased demand and new operators*

2.0: Numbering Plan Principles

- **Numbering Plans need to conform to the following minimum criteria:**
  - *should aim for longevity*
  - *Clear and understandable (User friendly)*
  - *Capable of expansion for new Operators*
  - *Reflect services and location*
  - *Neutral as regards competition*
  - *Cater for portability*
- **Common Principles should be applied to:**
  - *Geographic and Non-Geographic numbering*
  - *Find me anywhere*
  - *New services*
  - *Short codes*
  - *Dialling plans*
- **Implementation of any new numbering and dialling plan needs to take into account the business and regulatory environment as well as the needs of the end users.**

3.0: Components of Numbering Plans(1)

- **Availability:**
  - *ensure constant and consistent resource inventory - exhaustion for an acceptable period of time will have to occur*
- **Provisions for New Technology, Services, Service Providers:**
  - *ensure the introduction and growth of new and existing technologies, services and service providers*
- **Forecasting:**
  - *The numbering plans should forecast service exhaustion as well as future services.*
- **Conform to Regional and International Standards:**
  - *Numbering Resources should conform to agreed regional and international standards to ensure regional as well as global inter-working.*

Components of Numbering Plans (2)

Other Numbering Plan Attributes to be noted include:

- **Featuring format expansion potential**
  - *Even though a new numbering plan provides adequate numbering and dialing resource capacity for an acceptable period of time, exhaust will inevitably occur*
- **Support call processing and routing**
  - *Destination addressing is the primary function of every call*
- **Accommodation for short codes**
  - *Space should be allocated while developing new numbering and dialling plans for short codes*
- **Implementation of alpha-numeric keypad**
  - *The decision to have a combination alpha/numeric keypad can impact heavily on number utilization*

4.0: Options of Numbering Plans (1)

- Numbering Plan **Options** are:
  - Open Plan, codes and numbers
  - Closed Plan
  - Mixture of both
    - *And are explained in the following slides*

Options of Numbering Plan (2)

- Open Numbering Plan (1)
  - Numbers are split into code **+** directory number. Local calls do not require the code to be dialled (but networks should always allow use of local code).
  - EITHER, the first digit of the prefix will be an “escape” digit (such as “0”);
  - OR, a rule must be established to determine whether the number string dialled is “local” or “national”.

Options of Numbering Plan (3)

- Further explanation on Open Numbering Plan
  - If the first digit(s) of the prefix is/are escape digits, they will normally be omitted on incoming calls from other countries. For example:

    (National) 021 233096
    (International) +233 21 233096

  - Since the escape digit is frequently "**0**", the prefix "**00**" cannot be used for subscriber numbers, but can be used for international access.

  - Use of "**00**" as an international code is recommended (**but not mandatory**) as most countries use the code hence easier for country visitors to access telecomm services.

Options of Numbering Plan (4)

♣ Closed Numbering Plan (1)

- No escape digit
- Whole number dialled in national format
- Easier to administer
- Used for Countries with small population

– **Advantages**

- *More flexible*
- *Number space more fully usable*

– **Disadvantages**

» *May become anti-competitive if care is not taken*

» *Longer numbers always dialled, due to loss of local dialling*

» *Complications on equipment design*

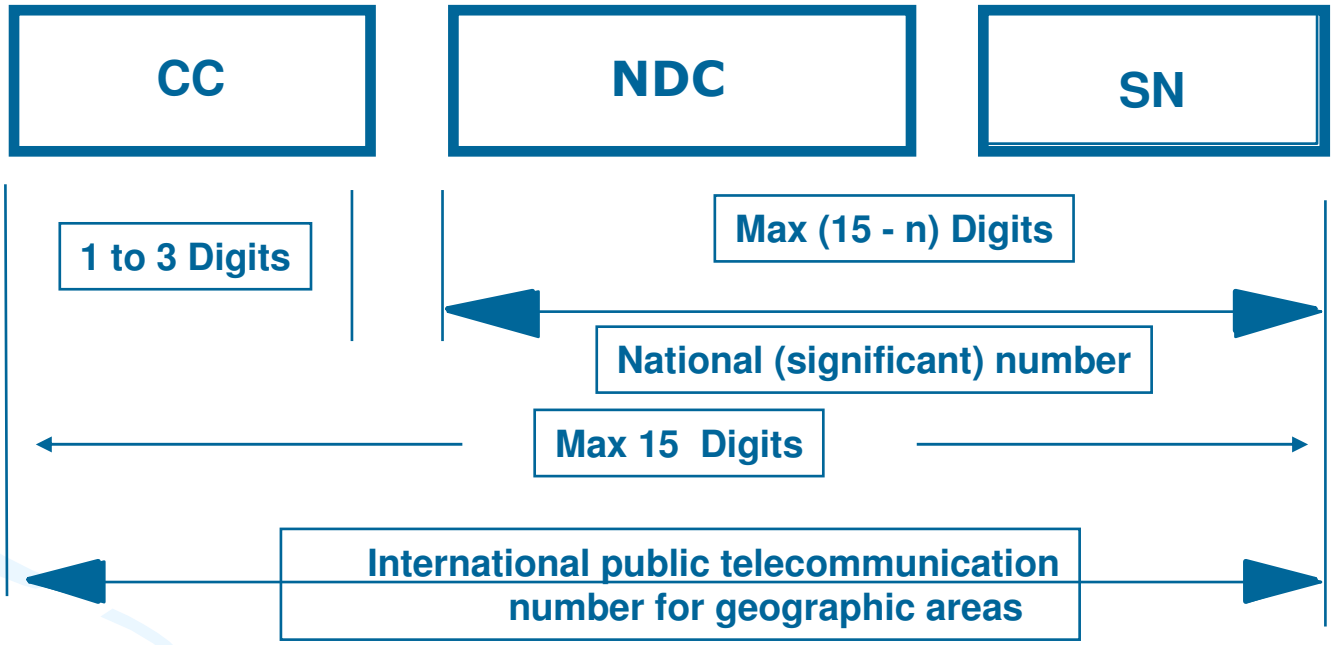
5.0: Numbering Plan Formats

- The International Telecommunication Union (ITU) develops global Recommendations. Those providing Numbering Formats include the following:

  - Rec. E.164 as the public telecommunications numbering plan
  - Rec. E.212 as international identification plan for Mobile terminals and Mobile users
  - Rec. X.121 as international numbering plan for Public Data networks
  - Rec. Q.708 for Signalling Point Codes numbering planning

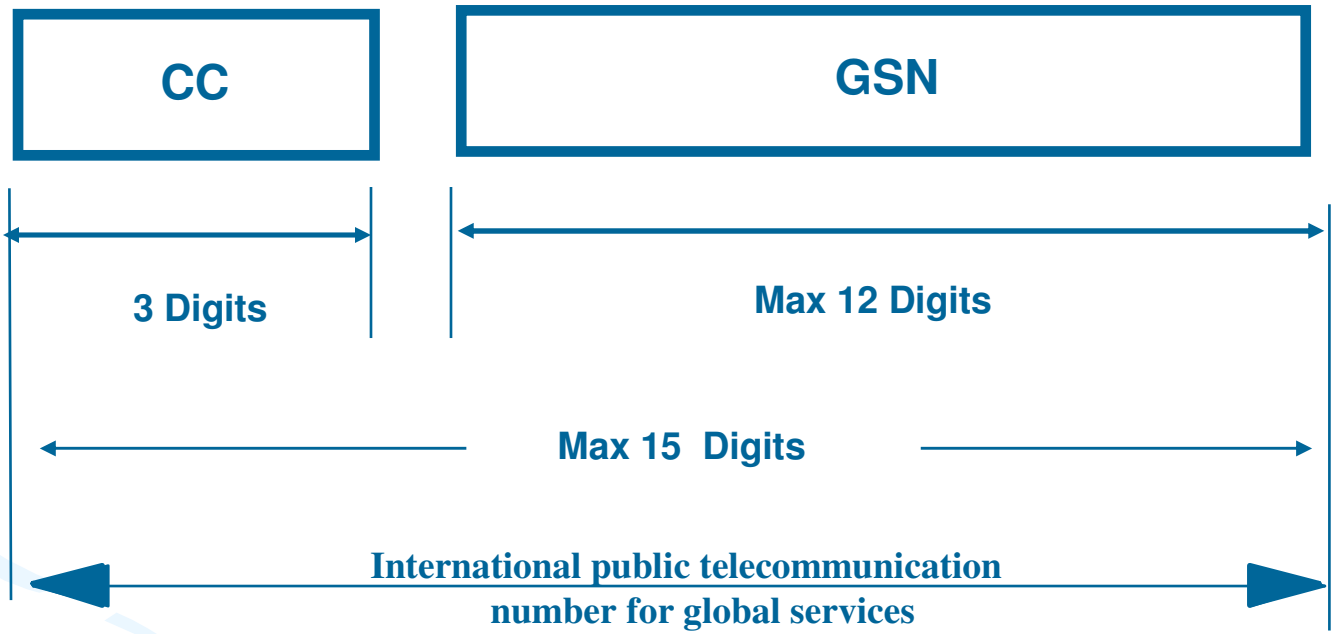
Numbering Plan Formats (1)

♣ ITU-T Rec. E.164 Format – Geographic Numbering:



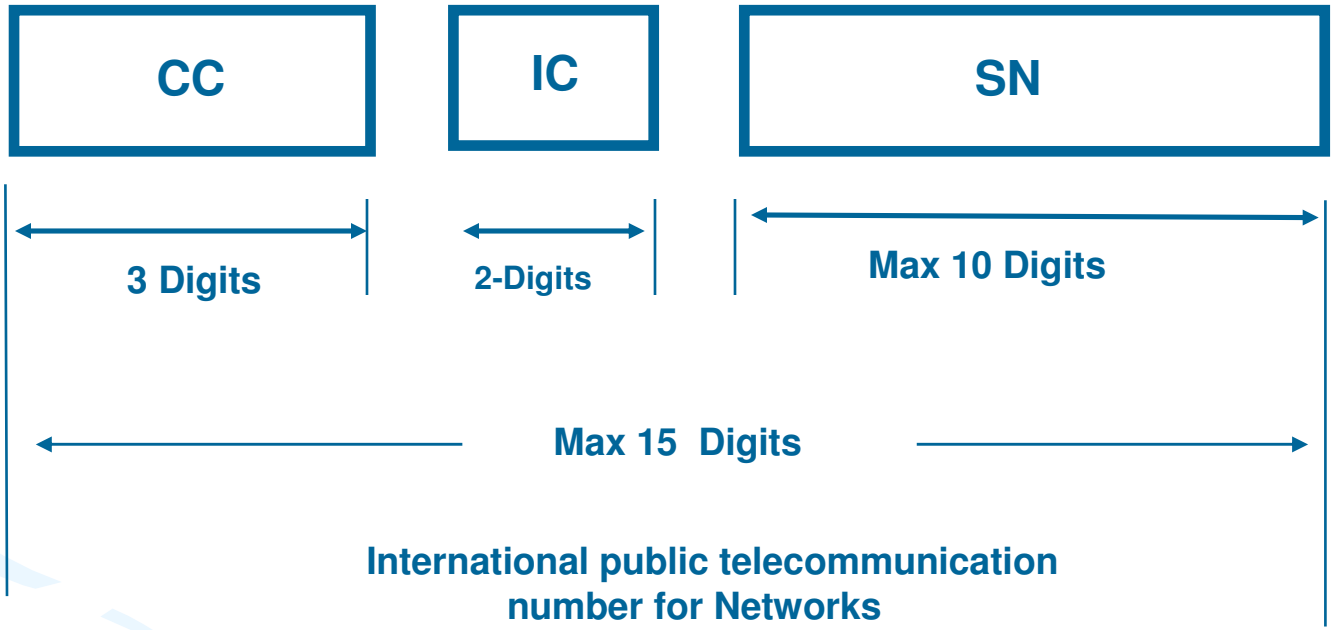
Numbering Plan Formats (2)

- **ITU-T Rec. E.164 Format – Global Services:**



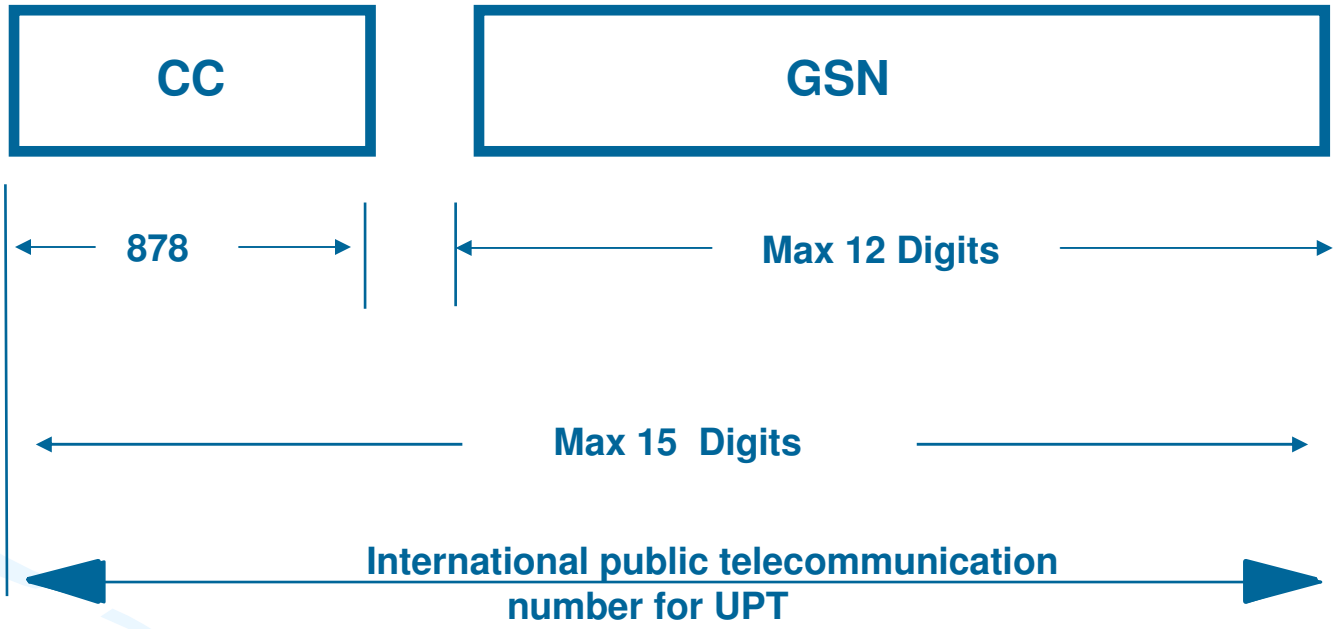
Numbering Plan Formats (3)

- **ITU-T Rec. E.164 Format – Networks:**



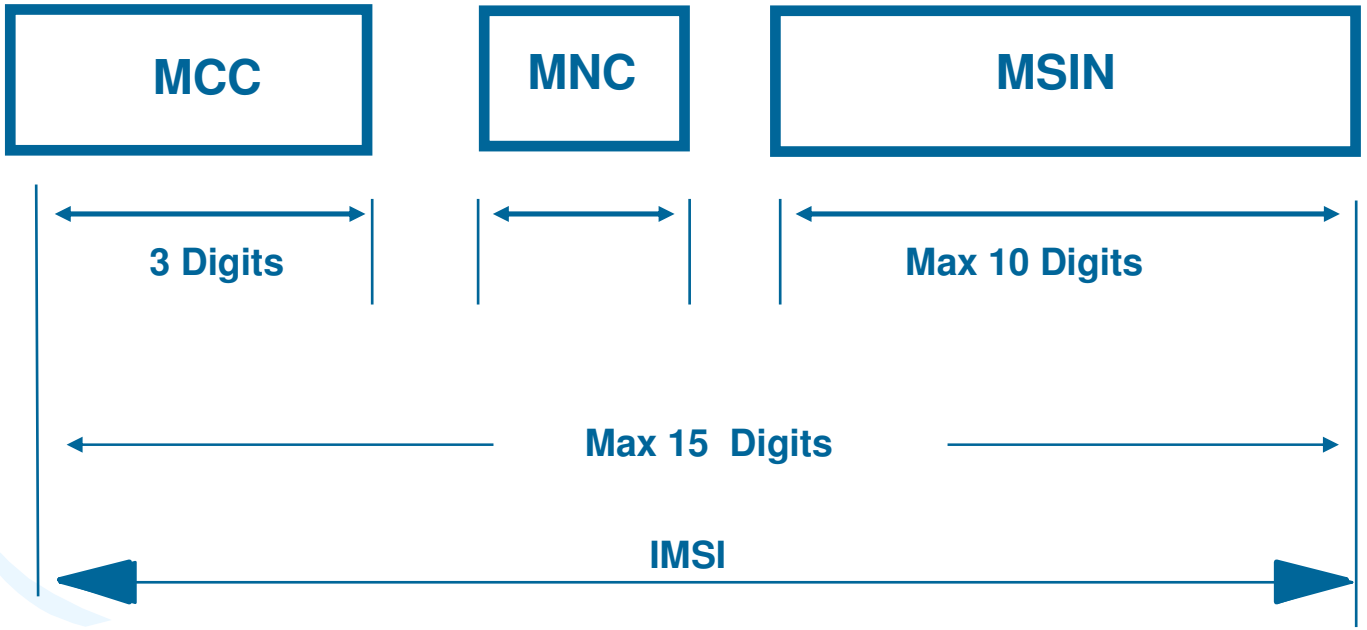
Numbering Plan Formats (4)

- **ITU-T Rec. E.168 Format – UPT:**



Numbering Plan Formats (5)

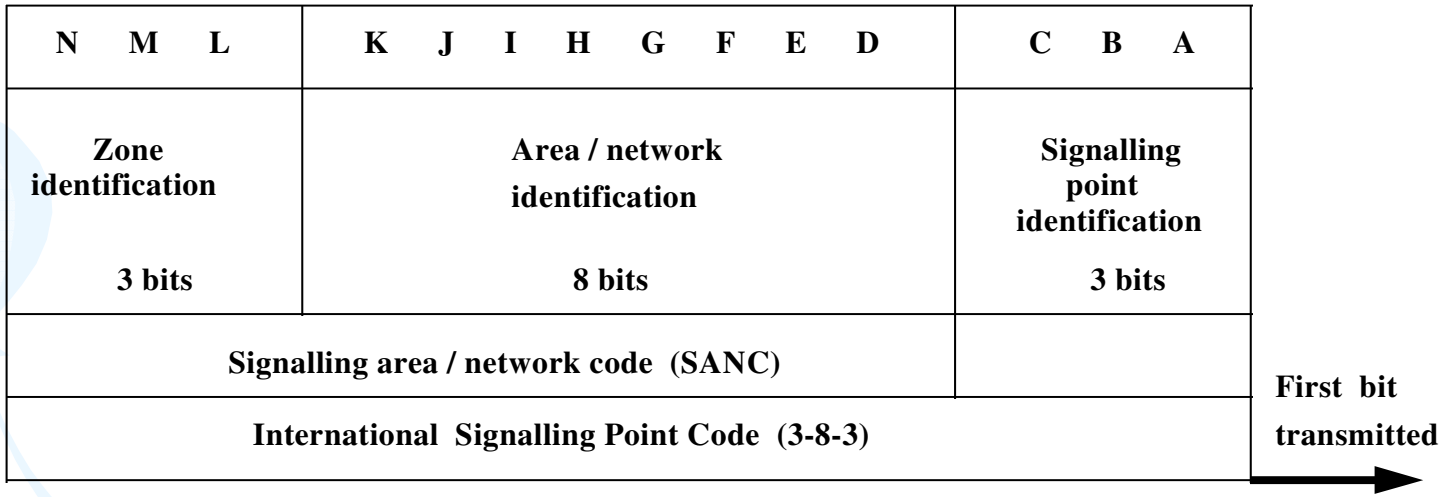
- **ITU-T Rec. E.212 Format - IMSI:**



MCC – Mobile Country Code
MNC – Mobile Network Code
MSIN – Mobile Subscriber Identification Number
IMSI – International Mobile Subscriber Identity

Numbering Plan Formats (6)

♣ ITU-T Rec. Q.708 Format – International SPC:



NML – *3-Bit sub-field defining the World geographical zone where the network is located.*
KJIHGFED – *8-Bit sub-field identifying geographical area or network for a specific world zone.*
CBA – *3-Bit sub-field identifying the signaling point (International exchange) for specific area.*
3-8-3 – *The ISPC bit pattern/format*

Numbering Plan Formats (7)

♣ ITU-T Rec. Q.708 Format – National SPC:

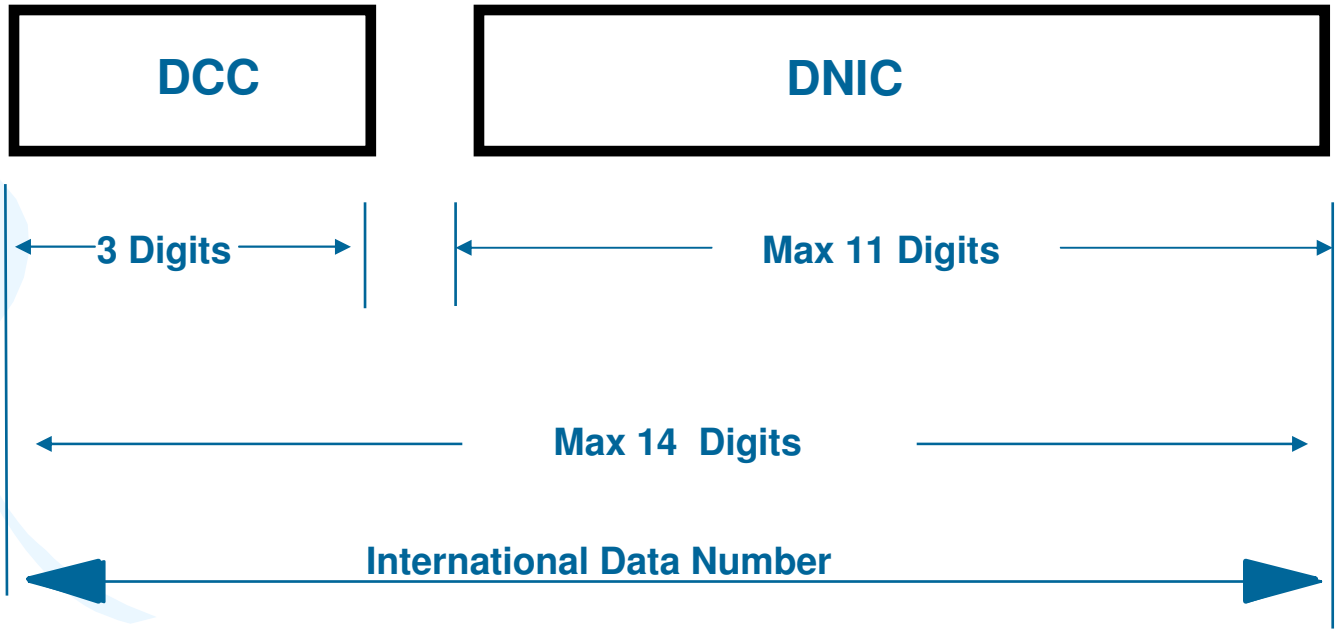
N M L K	J I	H G F	E D C B A
Network /Operator identification 4 bits	Exchange type (hierarchical layer) identification 2 bits	Geographical area identification 3 bits	Signalling Point (exchange) identification 5 bits
National Signalling Point Code (4-2-3-5)			

First bit transmitted →

NMLK – *4-Bit subfield that defines the network (operator).*
JI – *2-Bit subfield that defines the hierarchical layer of the signalling point for the operator network.*
HGF – *3-Bit subfield that defines the geographical area where the signalling point is located.*
EDCBA – *5-Bit subfield that defines the signalling point within the geographical area.*

Numbering Plan Formats (8)

- ITU-T Rec. X.121 Format – Data Networks:



DCC – *Data Country Code*
DNIC – *National/Local Data network Identification Code*

6.0: Designing a Numbering Plan

The philosophy behind designing any Numbering Plan lies on:

- Use of the ITU-T Formats as a guiding tool
- Designating particular parts ("blocks") of the national number space for specified purposes, e.g.
  - specific locations
  - mobile,
  - Geographic,
  - non-geographic,
  - reserved,
  - unusable

Is As Simple as that!!!

Further Reading

- www.itu.int/


Q. 708


X. 121


E.168


E.164


E.212

PART 3: Numbering Resources Administration and Regulation

- Review on International Numbering Administration
- Numbering Administration at National level
- National Numbering Regulation
- Session Conclusion

1.0 Global Numbering Administration

- **The International Telecommunication Union (ITU)**
  - Founded back in 1865 as a Specialised Agency (for Telecommunications) and is under United Nations
  - Previously was International Telegraph Union, it is an International standards making body.
  - Governments (*Member States*) and the private sector (*Sector Members*) jointly co-ordinate global telecom networks and Services standardisation.

Global Numbering Administration(2)

- **The International Telecommunication Union's Structure**

The ITU has three Sectoral Bureaus:

- **ITU-T** (previously CCITT) for Telecom Standardisation
- **ITU-R** (previously CCIR) for Radio-communication
- **ITU-D** for Telecom Development

Global Numbering Administration(3)

- **The Role of the ITU-T (or ITU-TSB) Bureau**
  - Develops Standardisation for Numbering Resources:
  - Provides guidelines and formats in the form of "RECOMMENDATIONS" for numbers on International and National uses.
  - Coordinates Implementation of International and National Number changes.

Global Numbering Administration (4)

- **The ITU-TSB is also r**esponsible for Allocation and Assignment of:
  - Country Codes
  - International Signalling Point Codes (ISPC)
  - International Codes for Public Data Networks
  - International public telecommunication number for geographic areas
  - International public telecommunication number for global services
  - International public telecommunication number for Networks
  - International public telecommunication number for Universal Personal Telecommunications (UPT)
  - Mobile Country Codes

Global Numbering Administration (5)

- The Telecommunications Standardization Bureau (ITU-TSB) in developing international Recommendations:
  - Has established E.164 as the public telecommunications numbering plan
  - Initially E.164 only identified geographic countries
  - E.164 has evolved to accommodate the introduction of global services and the ability to assign resources to Networks
  - Enable the origination and termination of international traffic
- Various Formats were discussed during Session 2

2.0 National Numbering Administration

- In a liberalized market, the government through national regulatory authority establishes numbering policy in consultation with national stakeholders like service providers, operators, vendors, users, etc.

- In the process, the government through national regulatory authority may issue a discussion draft on National Numbering policy or any implementation plans for new capabilities, e.g. number portability

3.0 National Numbering Regulation

- In a competitive environment, Numbering Policy states and directs the legal, legislative, and regulatory basis by addressing:
  - New functions required of the national numbering plan, such as number portability, carrier selection, charging for numbers (for funding of the regulatory body having the oversight role on the national numbering plan)
  - Guidelines for assigning numbering resources to all service providers
- Management or oversight of the national numbering register is done by national regulatory authority

4.0: Session Conclusion

- ITU-T has a global role to standardise Numbering Resources and all members need to participate in its activities.
- Numbering plans should consider future expansions
- Numbering plans should conform to international standards for inter-working
- Numbering plans should be user friendly with unique formats
- Numbering plans should allow for service diversity
- There should be a policy that govern numbering plans

Further Readings & Acknowledgement

- www.itu.int
- www.icc-uk.com

7.0 E-Contact

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