

# The Future of Numbering..... .....and some recent challenges



# A word about the future of Numbering

- New underlying trends will change things
  - - Digitalisation – the New Voice Architecture concepts; feature rich services on multi-service networks
  - - Liberalisation – breaking monopoly control
    - emergence of Skype and VoIP
- Technology changes
  - fibre providing high capacity links
  - costs falling faster than demand
- New devices/capabilities

# Future impacts on Numbering Plans (1)

- Geographic numbers may no longer need to support distance related tariffs in the longer term
- Geographic significance of a number may change with the result that geographic numbers become more “non-geographic”
- Tariffs may fall leaving fewer services with high tariffs
- Flat rate calling plans may become more common place and inclusion in flat rate tariffs would then become an important issue
- Flat rate reduced tariffs may reduce demand for freephone
- Nomadicity has spread to existing services as IP technology is adopted, and it has become more difficult to restrict where numbers are used within the region of nomadicity
- VoIP and high roaming charges could increase demand for additional numbers for the purpose of reducing charges

# Future impacts on Numbering Plans (2)

- Numbers may increasingly be associated with services for which they were not originally allocated.
- The linkage with the service provider through which the number was allocated will be broken and the number will become more personal
- Secondary allocation between operators is likely to increase as new operators wish to work behind existing operators (normally non-incumbent ones) both to share facilities such as number portability ordering systems and to gain improved connectivity
- New ranges may be needed for fixed mobile convergence services
- Pressure for number portability between different services will increase subject to the tariffs not being too different
- Internet of Things (IoT)

# Some initial thinking on the way forward

- Scope of numbering ranges will widen
  - Subscribers retain existing numbers for enhancements to existing services/ compatible and new services
- Geographic significance for numbering will reduce
  - impact on Interconnect?
- Nomadcity will be recognised as a real user benefit
  - the impact on numbering plans will have to be recognised
- Pressure will increase to lower termination rates
  - increase scope for convergence and number portability?
- Regulators will need to allow more sub-allocations
- Pressure will come to allow numbers to be made available to users who are not resident in a country or area in order to have a virtual presence there

# Some Issues emerging on the future direction

Several issues will need to be addressed including;

- impact on accounting, privacy, misuse, fraud, legal interception
- cost and the impact on users and networks
- impact of nomadicity on emergency services
- how to educate users to understand changes
- maintaining tariff transparency
- maintaining consumer protection
- Potential impact on national number plan exhaustion, data protection, authority over non-residents etc if numbers are to be used outside of national boundaries

# Numbering Principles - moving forward

- Emerging technology will continue to fuel customer expectation and demand
- The nature of the demands placed on Numbering plans will change
- Numbering plans will continue to be very important
- Numbering Principles will continue to evolve to meet future requirements

The future will be even more demanding than the past!

# Drivers for Change - 1

New underlying trends will continue to drive changes across the globe

- Fixed Mobile convergence
  - various approaches, can be offered behind mobile or fixed number
  - Seamless call handover, public WiFi hotspots, single billing
- Liberalisation
  - breaking monopoly control
  - emergence of Skype and VoIP, Social Networking and innovative Applications



# Drivers for Change - 2

## Technology changes

- fibre providing high capacity links, intelligent handsets

## Digitalisation – the New Voice Architecture concept

- feature rich services on multi-service network
- architecture connects core to fixed & mobile networks (Including IP based networks)

.....and recently IoT

- some applications will continue to use E.164 numbers for a long time

# Does VoIP impact E.164 ?

- A Network Technology – no E.164 numbering issues
- Peer to Peer services – no E.164 numbering issues
- New & Substitution services – **E.164 numbers reqd**
- Numbering should be technology neutral
- Choice of number ranges interacts with operators commercial objectives
- Possible number ranges:
  - Geographic
  - Mobile
  - Personal
  - Corporate
  - New

# Geographic Numbers

- Familiar to customers
- Implies (relative) low call charges
- (potentially) Stimulate competition
- Modify definition to allow Nomadcity, e.g.
  - Limited area
  - Countrywide but user relationship to location (e.g. postal address)
  - Remove geographic relationship
- Potential major change to interconnect & consumer prices (cost based) and network routing

# Mobile Numbers

- Recognised numbers
- Perceived high call charges
- Nomadicity has some relationship to Mobility
- Confusion between mobile services (e.g. SMS, voice mailboxes) and VoIP functions (*although SMS slowly becoming available in PSTN handsets with display capability*)
- VoIP doesn't require radio spectrum licence
- Blurs distinction between mobile and other number ranges

# Personal Numbers

- VoIP identifies a terminal
- Personal Numbers identify an individual (usually) Associated with high call charges
- Requires number change when a substitution service for PSTN
- May inhibit Number Portability for residential customers

# New Number Range

- Recognises new functionality
- Retains existing definitions of number ranges
- Customers unfamiliar with numbers
- Simplifies appropriate customer and interconnect prices
- Requires number change when a substitution service for PSTN
- May inhibit Number Portability depending on implementation & technology

# Numbering Implications / assumptions

- Number Plan is designed around broad service definitions
- Number Plan is technology independent
- Quality is not an attribute of a number range
- Numbers should continue to be allocated on the basis of service attributes
- New service concept require of the Number Plan:
  - New definition of Geographic (with smaller block sizes) or
  - New Number range (if genuinely new service definition)

# Extra Territorial use of E.164 numbers

- Extra territorial use vs. permanent roaming
- The issue:
  - ‘The use of telephone numbers from one country on a permanent basis in another country’*
- Some benefits for users
- National & International regulations not addressed
  - national scarcity of numbers
  - applicable jurisdiction
  - adherence to specific legal requirements

Ideally a common approach is required



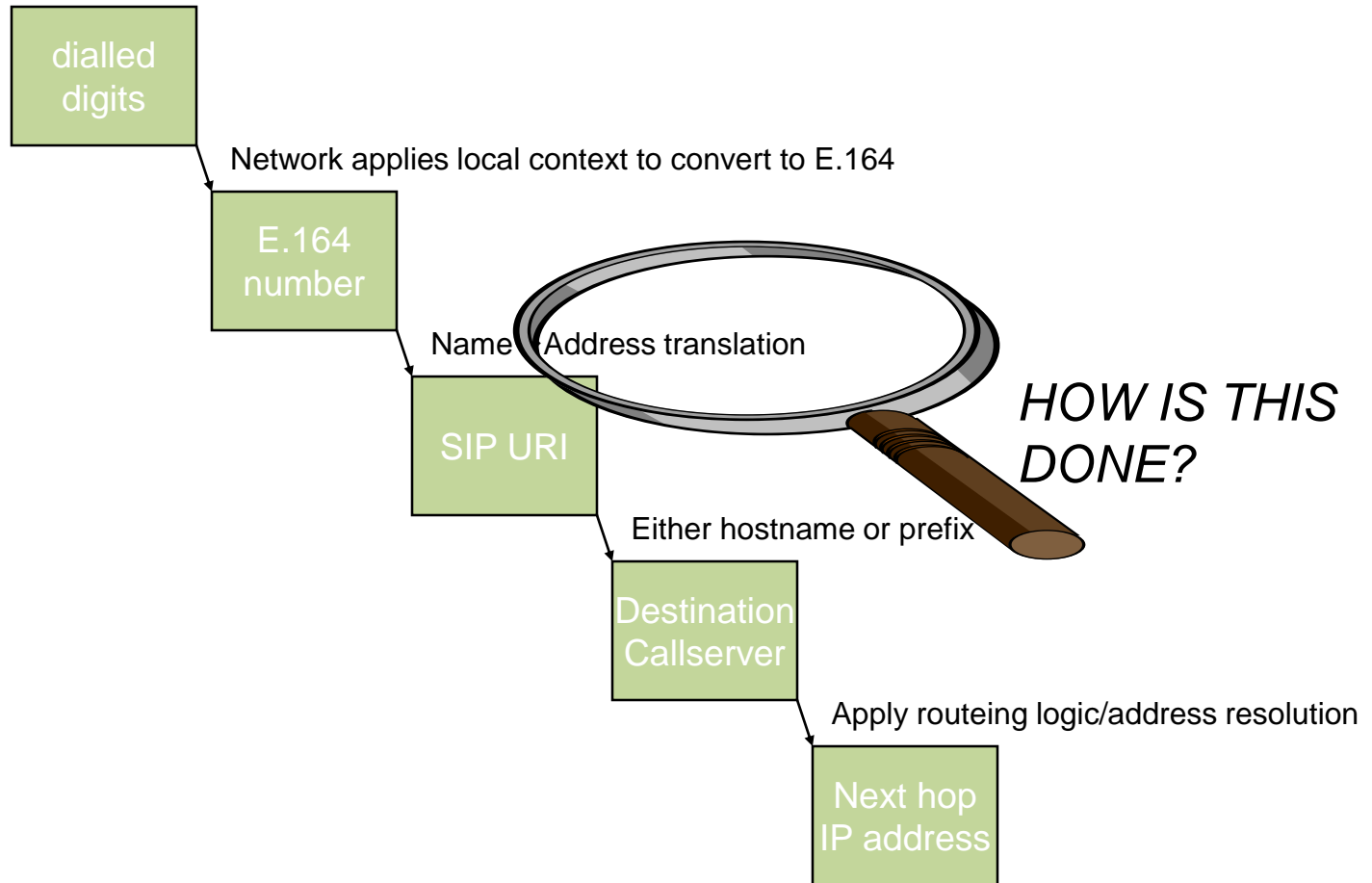
# New Voice Architectures - the vision

The starting point

- A New Voice Architecture is a *packet-based network able to provide services including Telecommunications Services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-technologies*
- Offers unrestricted access by users to different service providers.

Supports generalised mobility which will allow consistent and ubiquitous provision of service to users.

# From dialled number to destination



# Converting a name to an address

- Conversion of a number (name) to an address requires a database
- Internally, most NVAs will use a private ENUM database
  - But this is of little use for inter-operator calls
- What's will be required is a pan-operator database or a 'Global' ENUM

# The move towards new identifiers

- Users collecting more IDs as services multiply
  - the problem is managing them!
- Users will want to minimise them
  - call for multiple uses of existing IDs/numbers
  - portability between services
  - growth of customised address books
- Globally understood unambiguous IDs remain essential for consumers & networks
- Numbers transcend alphabets and languages

**They will remain important!**

# Numbers in New Voice Architectures (NVA's)

- New Architectures can mimic legacy PSTN use of numbers as both names and addresses
  - Early deployments did this
  - But it misses an opportunity to finally decouple the two
- Increasingly in NVA's a telephone number is just a name for an end-user's profile
  - There is no need for it to be tied to a specific node or line
  - There's no need to use it directly for call routing
  - It's just a database key to determine how to handle calls
  - NVAs then transpose this into underlying network addresses (e.g. sip addresses and ultimately IP addresses) that are used to route the call

# How should numbers be assigned in NVA's?

- Two models for NVA's
  - NVAs are for new services
  - NVAs replace existing services/emulate existing services
- New Services
  - New services can be given new numbers...legacy networks route in NVA(and vice-versa) based on number range
- Replacement/emulation
  - Could either migrate to NVA on a number range by number range basis, or
  - Could treat numbers as exported from TDM node to NVA and onward route or
  - Legacy networks could interface to the CDB to determine whether to route calls there

# Comparison of User & Infrastructure ENUM

USER ENUM	Infrastructure ENUM
Public Internet	Private DNS Infrastructure
Requires NRA responsible for the E.164 Country Code to sanction delegation of Tier 1 registry	Requires no regulatory agreement
User/Administration decides on participation	Communications Provider decides on participation
Single number opt-in by user	All numbers inserted
User controls input data	CP controls input data
ENUM registrar uploads data	CP uploads data
Public User ENUM would be in the e164.arpa domain name space	There is no commonly recognised domain name – many options

Questions?