ENUM & Thinking about Regulation

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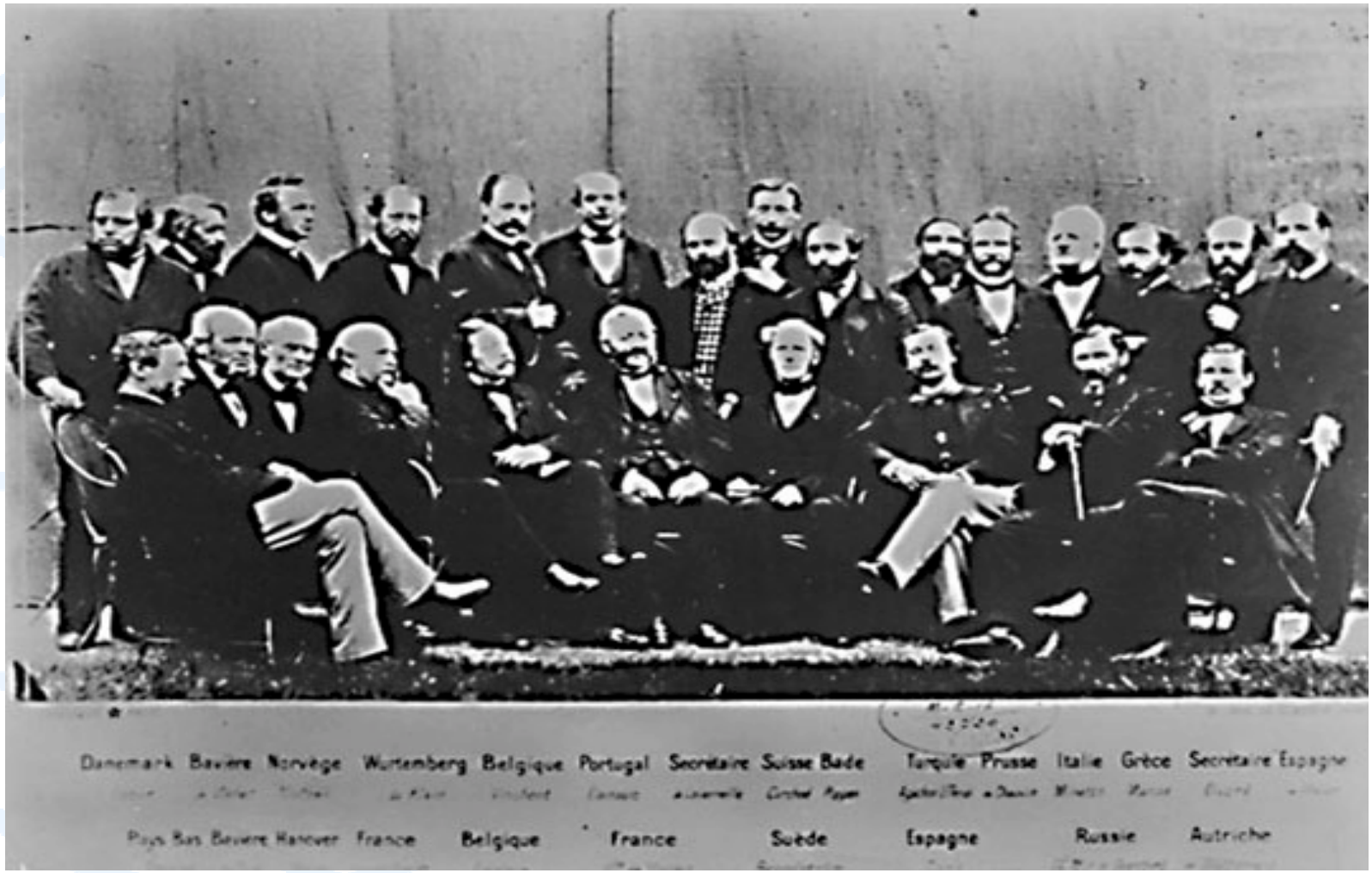
Note: The opinions expressed in this presentation are those of the author and do not necessarily reflect the views of the ITU or its Members.

Interoperability

Curious George

- Interoperability of networks has always been a challenge and opportunity.
- You probably don't remember when people use to have multiple phones on their desk?

Interoperability was what these people wanted…



Founders of the International Telegraph Union: 1865

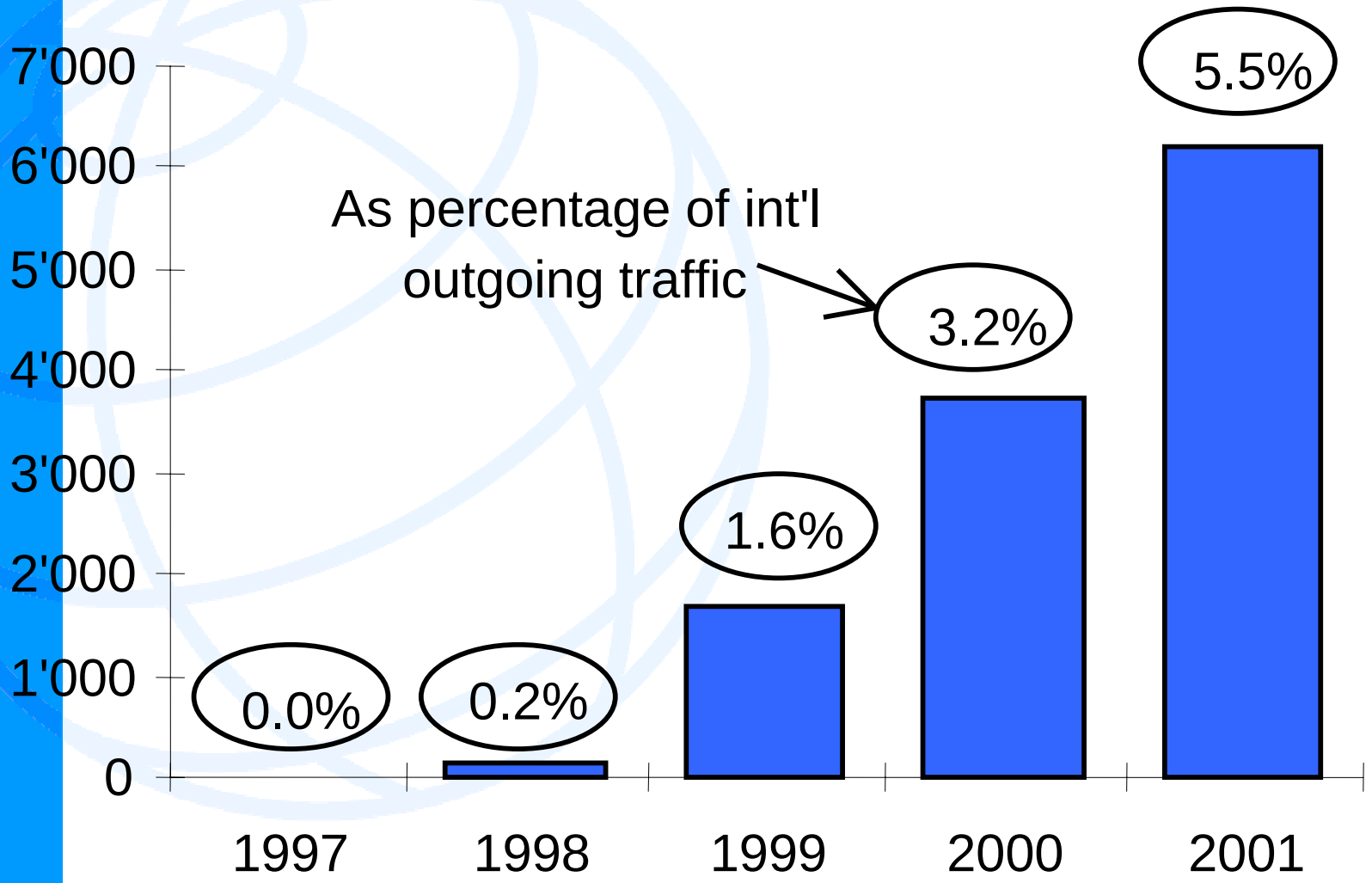
ITU Standards & Internet/IP-based Networks

- ITU standards widely deployed at many levels of the Internet, particularly at transport/backbone level (e.g., ATM, FR, Optical Networks) and user access network (e.g., modems, DSL)
- Much of ITU-T technical standardization is related to IP-based networks (e.g., IP telephony (e.g., H.323, Media gateways), MPLS, IP OAM)

ENUM: Technical Convergence

- Problems of addressing calls that pass from one network service to another:
  - Now widely possible to originate calls from IP address-based networks to other networks
  - But uncommon to terminate calls from other networks to IP address-based networks
  - To access a subscriber on an IP address-based network, some sort of global addressing scheme across PSTN and IP address-based networks needed
- ENUM seen as “glue” solution…
  - e.g., roundabout way to assign E.164 resources to SIP terminals

Why is IP Telephony important?
IP Telephony traffic, in million minutes



Source: ITU Internet Reports, adapted from TeleGeography Inc.

IP Telephony Flavours

- Often treated differently from policy or regulatory perspective
  - Carried solely across the public Internet?
  - IP as underlying transport or signalling technology for PSTN services (e.g., using SS7)?
  - IP telephony on full end-to-end “private” IP networks (e.g. using “softswitch” technology)?
  - Combinations of the above with gateways between Internet or private IP-based networks and the PSTN?

What is ENUM?

- ENUM takes numbers from the international public telecommunication numbering plan (ITU-T Recommendation E.164) and incorporates them into the Domain Name System for the purpose of identifying and finding network resources
- This includes the possibility of assignment of E.164 resources to IP-based devices
- Defined in RFC 2916
- Telephone number in – URI/URL out…

How are E.164 Numbers Mapped to the DNS?

- One-to-one reverse mapping of digits in an ITU-T Recommendation E.164 number into separate DNS “zones” — which are then concatenated with another domain.
- Example: +33 140205151 (Louvre Museum)
- Remove all characters with the exception of the digits and put dots (“.”) between each digit.
- Example: 3.3.1.4.0.2.0.5.1.5.1
- Reverse the order of the digits and append the ENUM Tier-0 zone to the end.
- Example: 1.5.1.5.0.2.0.4.1.3.3.e164.arpa

In this simple protocol, there are many hidden issues!

How Does ENUM Work?

- Input : query for E.164 number in DNS
- 8.3.3.5.0.3.7.2.2.1.4.e164.arpa
- Output: NAPTR RR's - In this response the preferred contact method is SIP
  - ord pr fl service re replacement
  - IN NAPTR 10 10 "u" "sip+E2U" "!^.*$!sip:robert.shaw@itu.int!" .
  - IN NAPTR 102 10 "u" "mailto+E2U" "!^.*$!mailto:robert.shaw@itu.int!" .
  - IN NAPTR 102 10 "u" "tel+E2U" "!^.*$!tel:+41227305338!" .
- Telephone number in, URL/URI out

Some Complexities

- In telecommunication numbering, regulatory tradition with strong government involvement (e.g., number portability,consumer protection)
- In the Internet, management of naming and addressing has been left to “industry self-regulation”
- National numbering/regulatory authorities involved in coordinating ENUM servers & services for their portion of E.164 resources in respective countries

National Consideration Issues

- Consultation process with interested communities
- National deployment Issues
  - How do you authenticate the identity of the subscriber for ENUM services?
  - Who are ENUM Registrars and what are they responsible for?
  - How do you validate ENUM data for potential users (Add - Modify – Delete) NAPTR list of services and preferences?
  - How is data provisioned in the country code name servers?

Public policy issues…

- INTUG View: ENUM may have effects on:
  - integrity of national numbering schemes
  - competition between service providers
  - telecommunications network security
  - number portability
  - carrier selection
  - emergency services calls (including passing of location information)
  - privacy
  - control over personal records
  - control of slamming

Exercise

- Some thought exercise questions which we can discuss…