



The National Post and Telecom Agency in Sweden

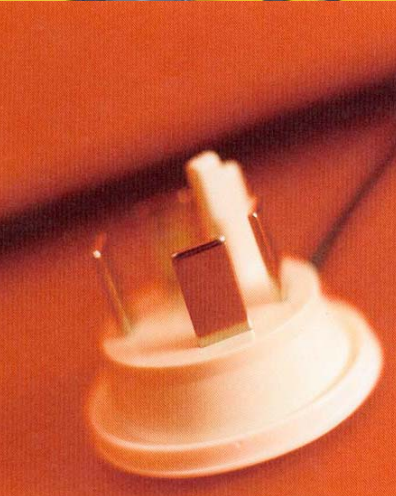
PTS

A Regulator Perspective on ENUM

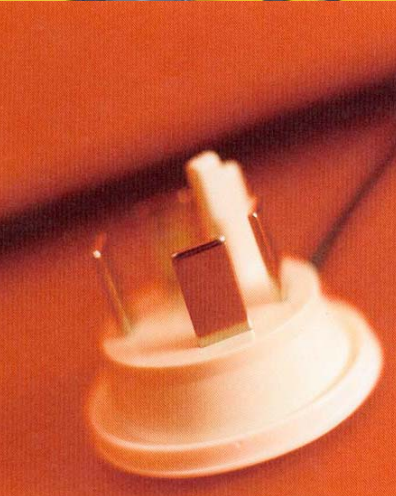
RIPE 47 Meeting – 28 January 2004

Joakim Strålmarm

Tel. +46 70 811 40 64 – E-mail joakim.stralmark@pts.se



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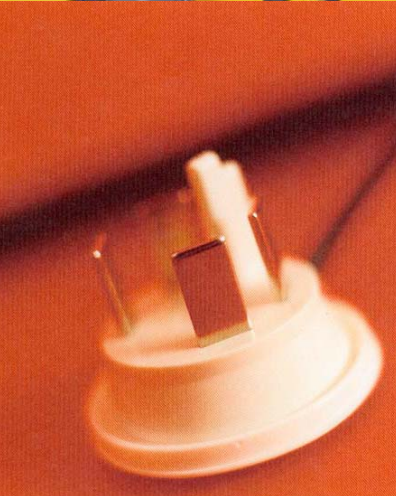


ENUM in Sweden

- About PTS and Sweden
- What is ENUM
- Government activity
- PTS ENUM report 2001
- Start of trial preparation
- Trial experience 2002/2003
- PTS ENUM report 2003
- State involvement in permanent ENUM – legal regulation?
- ENUM and self-regulation
- Privacy aspects of ENUM
- Commercial aspects and the future of ENUM and other "ENUMs"
- Next step in Sweden
- Some open questions and conclusions



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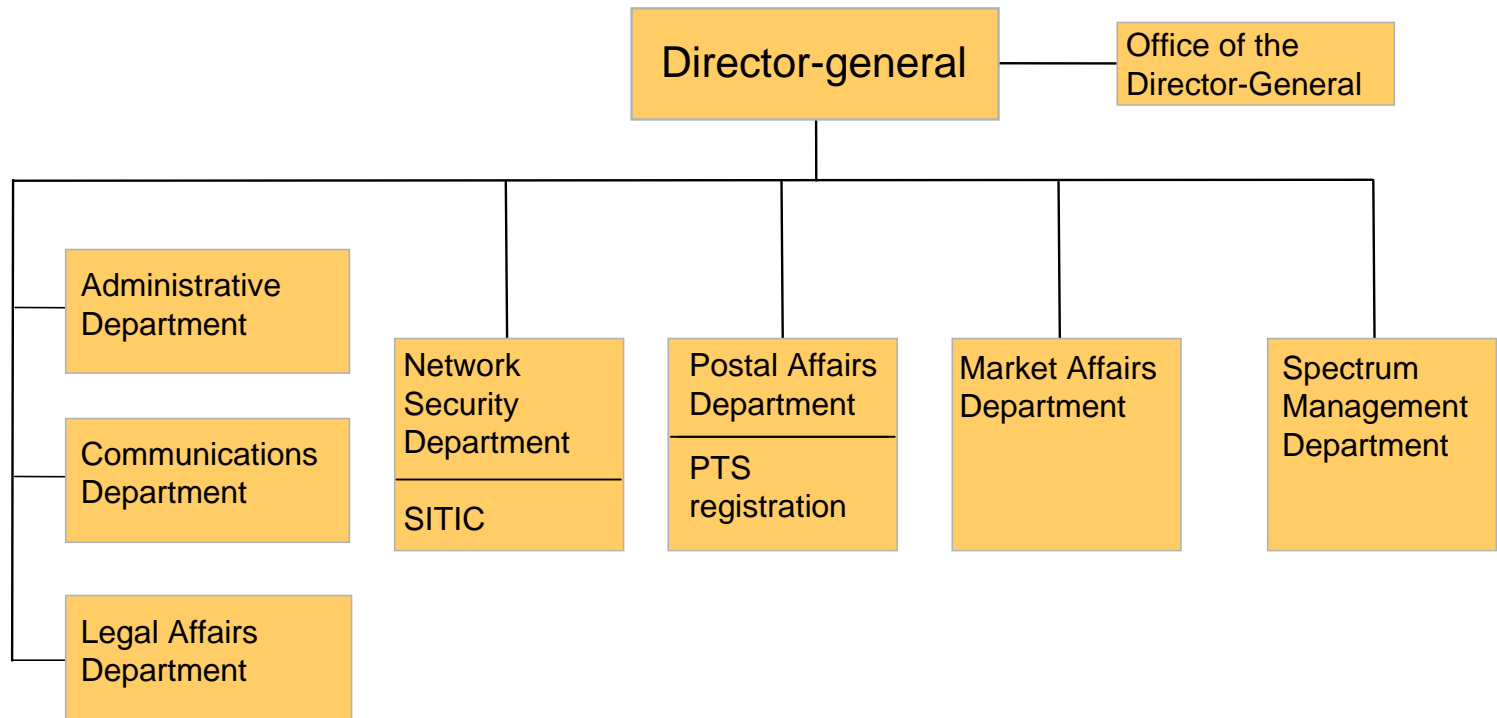
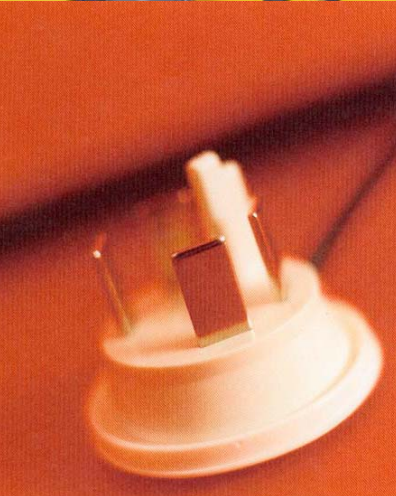
About PTS and Sweden



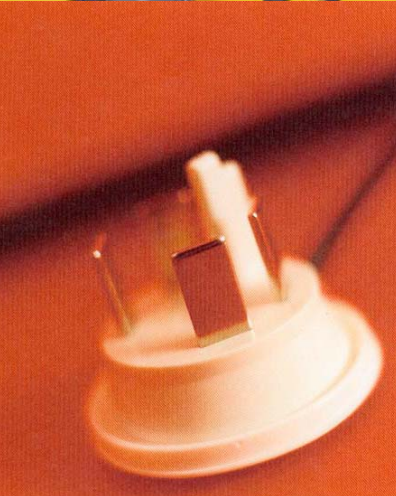
TeliaSonera

- Ministry of Industry, Employment and Communications is responsible for telecom regulations (ITU Member state representative)
- NRA/Administration - Post & Telestyrelsen
- Telecommunication Act in force since 1 July 1993 - introduced competition (before that no direct legal framework - "*unregulated monopoly*") – new legislation for electronic communications since 25 July 2003
- TeliaSonera is the incumbent (de-facto monopoly between 1918-1993 - competition in mobile since 1981) – 46,0 % state owned (19,4 % Finish state - merger 2002)





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About PTS and Sweden

PTS has four overall objectives:

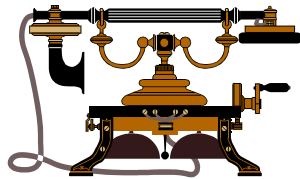
- Consumer interests in focus
- Efficient competition
- Efficient utilisation of resources
- Secure communications
- Monitors the telecommunications, IT, radio and postal sectors
- Founded in 1992
- Approx. 230 employees
- Financial model: By direct charges (operators and license holders (spectrum and numbers)), and by appropriations from the national budget.



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Some statistics - Sweden

8 971 000 population (4 400 000 households)



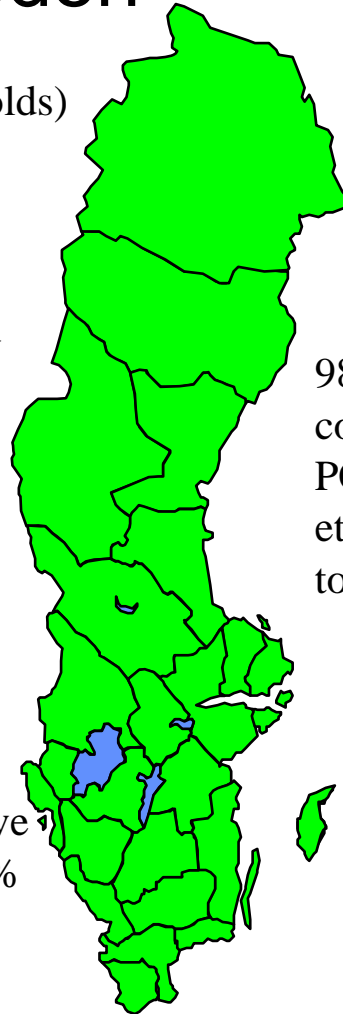
99% of the households have access to the fixed telephone service



90% of the population have a mobile phone
(*some with more MSs*)

@/www

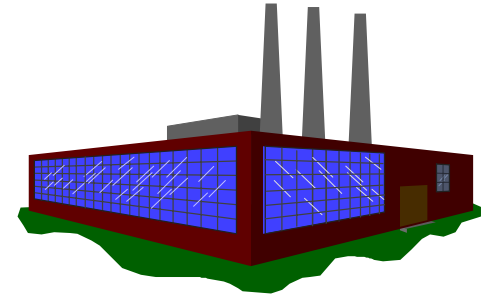
70% of the households have access to the Internet (16 % via higher transmission capacity "broadband")



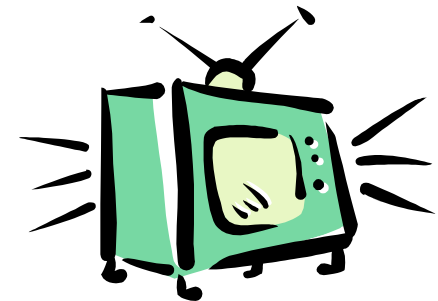
77% of the households have an PC at home



98% of the companies use PCs, computers etc. (95% access to the Internet)



47% of the households have possibility to access CATV



78% of the population have access to the **Internet** at either the home, work or educating



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About PTS and Sweden – Plans in electronic communications networks

- **Naming plans**

- Naming plan for Internet domain name - (TLD - .se) (ICANN ⇒ IIS ⇒ NIC-SE)
- Naming plan for X.400/F.401/X.402 - (C = se) (ITU ⇒ State ⇒ SIS ⇒ KTH-NOC)

- **Numbering plans**

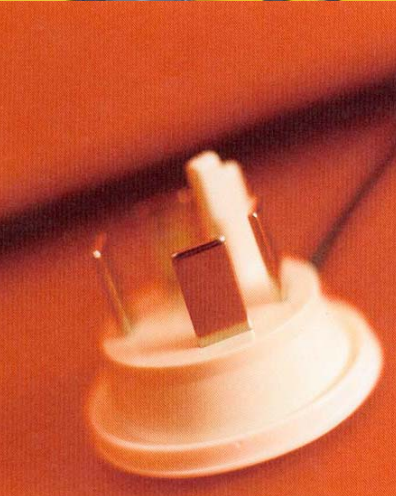
- Numbering plan for E.164 - (CC - 46) (ITU ⇒ State ⇒ PTS)
- Numbering plan for X.121 - (DCC - 240) (ITU ⇒ State ⇒ PTS)
- Identification plan for E.118 - (MII CC - 89 46) (ITU ⇒ State ⇒ PTS)
- Numbering plan for F.69 - (TNIC - S, TDC - 54) (ITU ⇒ State ⇒ PTS)
- Dialling plan for service codes - ETS 300 738 (ETS)

- **Addressing plans**

- Addressing plan for Q.708 - (9 SANCs) (ITU ⇒ State ⇒ PTS)
- Addressing plan for E.212 - (MCC 240) (ITU ⇒ State ⇒ PTS)
- Addressing plan for routing number for NP - SS 63 63 90 (PTS)
- Plan for PNC numbers (Zone Code CC- 2 40) - ETS 300 133-3 (ETS/ITU ⇒ State ⇒ PTS)
- Plan for CUG Interlock code - (TCC - 46) - Q.763 (ITU ⇒ State ⇒ PTS)
- Addressing plan for National Network Identifier (CC- 46) - X.125 (ITU ⇒ State ⇒ PTS)
- Addressing plan for NSPC - Q.704 (TeliaSonera – soon change to PTS)
- Addressing plan for ITU IND AESA - E.191 (ITU)
- Addressing plan for ISO DCC NSAP - ISO/IEC 8348/X.213 (ISO ⇒ SIS ⇒ KTH-NOC)
- Plan for OID (752) - ISO/IEC 8824/X.680 (ISO ⇒ SIS ⇒ KTH-NOC)
- Plan for IP addresses (ICANN ⇒ RIPE NCC ⇒ LIR)
- Plan for T(MNC) for TETRA - (T(MCC) - 240) - ETS 300 392-1 (TETRA MoU – soon change to ITU)



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What is ENUM

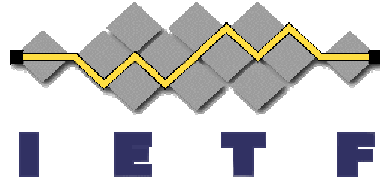
- ENUM - tElephone NUmber Mapping (IETF RFC 2916/2916bis)
- E.164-number mapped to an Internet domain name ("ENUM domain name") - 0.0.5.5.8.7.6.8.6.4.e164.arpa somewhere in the electronic communications network
- DNS for ENUM maps further the ENUM domain name to other *addresses* (e-mail address, SIP URL, H.323, webaddress, mobile number, IP Fax, UM, IM, LDAP, PKI, ?), then a query to find an IP-address
- ENUM supports communication between users normally reachable with identities from different plans (E.164 numbering plan & naming plan for Internet domain name) - *service and network convergence*



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What is ENUM



- take E.164 number
- turn it into a ENUM domain name
- ask the DNS
- return list of URI's

+46 8 678 55 00

0.0.5.5.8.7.6.8.6.4.e164.arpa.

mailto:pts@pts.se

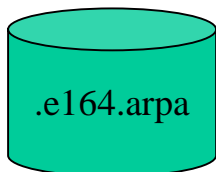
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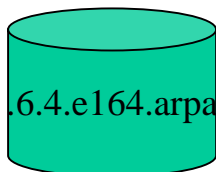
What is ENUM - TIER 0, 1, & 2

Tier 0



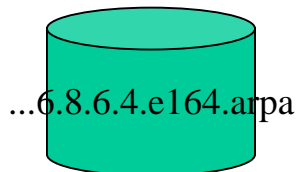
ENUM Root Level – DNS look up to find the country for a specific E.164-Country Code (CC) - *Manager: IAB - Registry: RIPE NCC - Registrar: ITU TSB*

Tier 1



ENUM CC Level - DNS look up to find the ENUM subscribers Tier 2 provider - *Manager: ITU Member State - Registry: choice of Manager - ENUM Registrar: national choice*

Tier 2

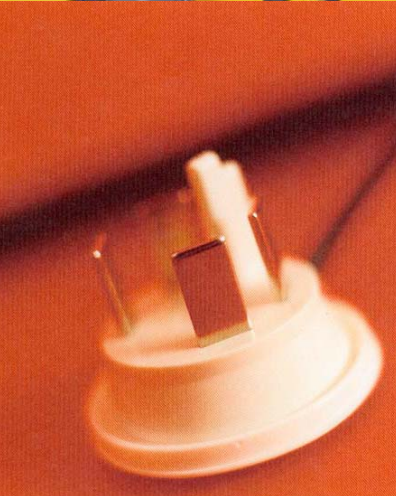


ENUM E.164 Number Level - DNS stores a list over different internet based addresses (URI:er) in NAPTR records. A look up in Tier 2 gives a list over different internet based addresses which are stored for one E.164-number - *Manager: E.164-subscriber - DNS Service Provider: choice of Manger*

```
IN NAPTR 10 10 "u" "sip+E2U"      "!^.*$!sip:kmccandless@illuminet.com!"
IN NAPTR 10 10 "u" "mailto+E2U"  "!^.*$!mailto:kmccandless@illuminet.com!"
IN NAPTR 10 10 "u" "fax+E2U"    "!^.*$!mailto:faxmachine5@illuminet.com!"
IN NAPTR 10 10 "u" "print+E2U"   "!^.*$!mailto:printer03@illuminet.com!"
IN NAPTR 10 10 "u" "tel+E2U"    "!^.*$!tel:+19135551212!"
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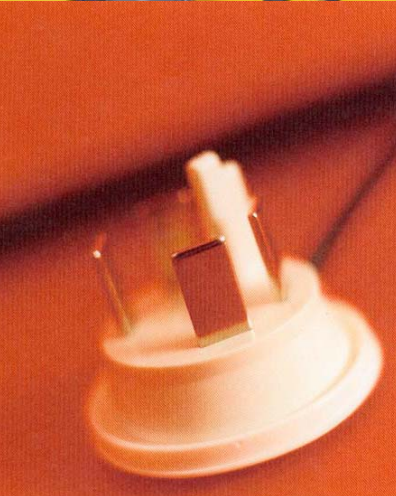


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Government activity

- Year 2000 - For the coming letter from the ITU (i.e. TSB Circular 26) the Government wanted some deeper information about ENUM and some idea of the consequences of an implementation with the involvement by the state
- Ministry of Industry, Employment and Communications request PTS to investigate the area
- In general - Government supporting different IT-activities (e.g. ENUM) - making Sweden to be "***an information society for all***"

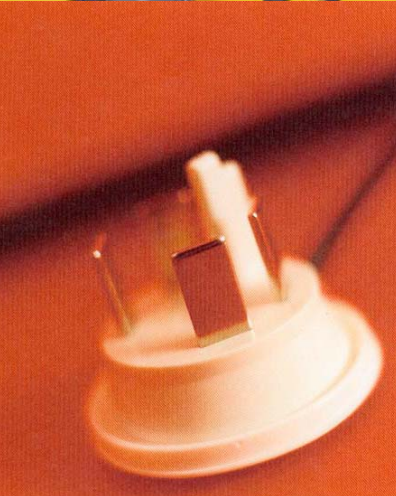


PTS ENUM report 2001

- PTS produced the ENUM report to the Government in April 2001
- English summary on www.pts.se
- In brief PTS gave 6 recommendations – *wait for permanent introduction, but do national trial.*
- The report was on a national consultation by the Government – *trial activity was supported*



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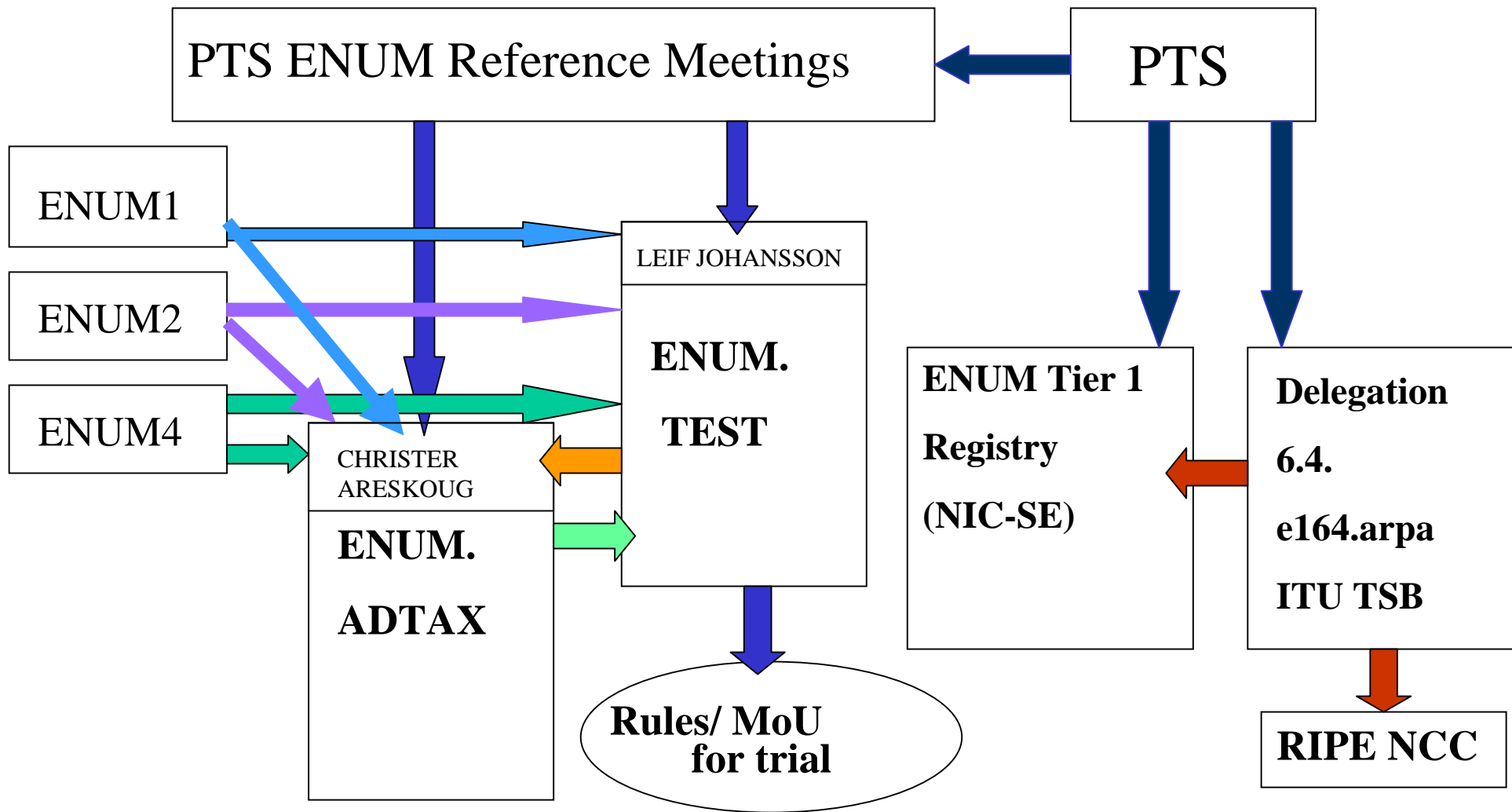


Start of trial preparation

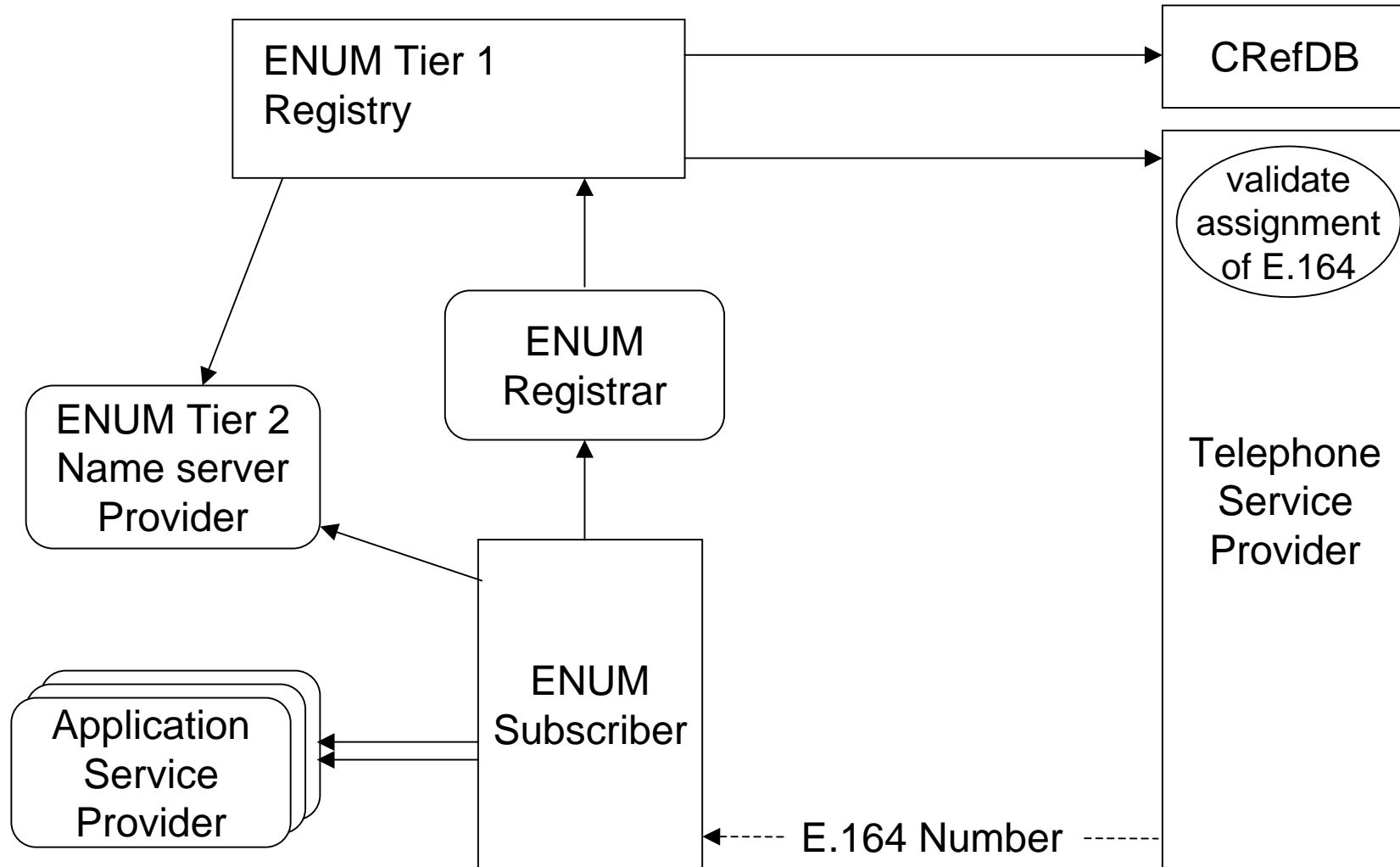
- Ministry request Dec. 2001 – National trial together with interested authorities and the telecom and Internet players.
- Issues in the trial/Government report – Responsibilities for ENUM, personal integrity, competition, handling of subscriber information, model for remuneration, need for regulations and how much the State should be involved in permanent ENUM etc.
- PTS report back to Ministry 31 July 2003
- *The Market have an opportunity with the trial, but PTS might need to push the market players forward*
- The trial financed by each participating party – no state money

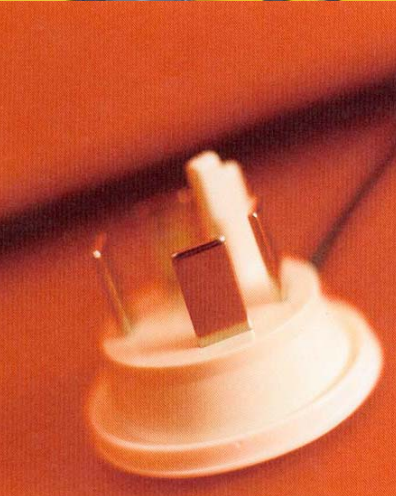


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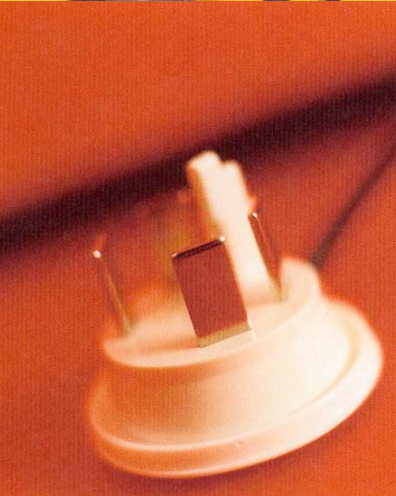
Entities





Trial experience 2002/2003

- ENUM – an early convergence function in the innovation phase for numbers (E.164-number) and name (ENUM-domain name) – technology works – administration needs much more work
- Common infrastructure tested – but no "killer application" – basic call (SIP-SIP, PSTN-VoIP gateway, PBX-PBX interconnect with PSTN bypass)
- Only pure E.164 numbers in the trial – no unlisted (ex-directory) numbers
- Building block in electronic communications networks – used for "IP-telephony" for PABX-users, but maybe not a necessity
- Interest traditional "E.164 operators"...
- ... but mostly attracts "Internet" players – igger interest in the beginning

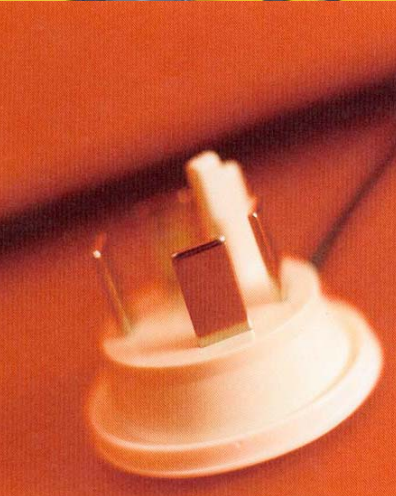


Trial experience 2002/2003

- PTS signed agreement with the ccTLD Registry (NIC-SE – no one else volunteered) for the ENUM Tier 1 Registry - .6.4.e164.arpa delegated on 13 dec 2002
- 30 registrations of ENUM domain names (14 covers DDIs) - both company, private persons and organizations – University of Stockholm – a large trial user
- 5 ENUM Registrars and 4 TSPs in the trial
- Different cultures – incumbent, new operators, academic Internet players and the NRA
- Lack of access network operators incl. mobile operators – the one who have the E.164 subscribers – TeliaSonera very active in the beginning – now more like an observer



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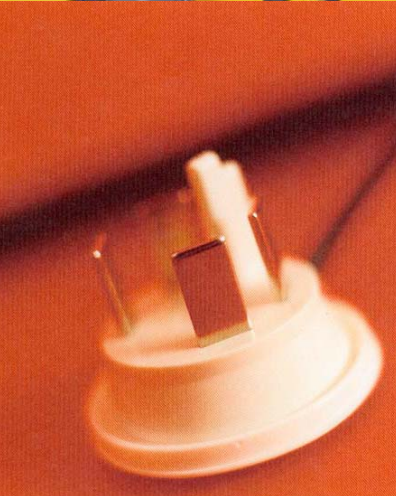


PTS ENUM report 2003

- Interim report to Government July 2003 - *suggest continuation of the trial until 2004-06-30 - ENUM still an interesting function for convergence*
- Cover some parts concerning state involvement in ENUM, the choice of ENUM Tier 1 Registry and privacy
- Final report to Government June 2004 – *will answer all the open questions... (?)*



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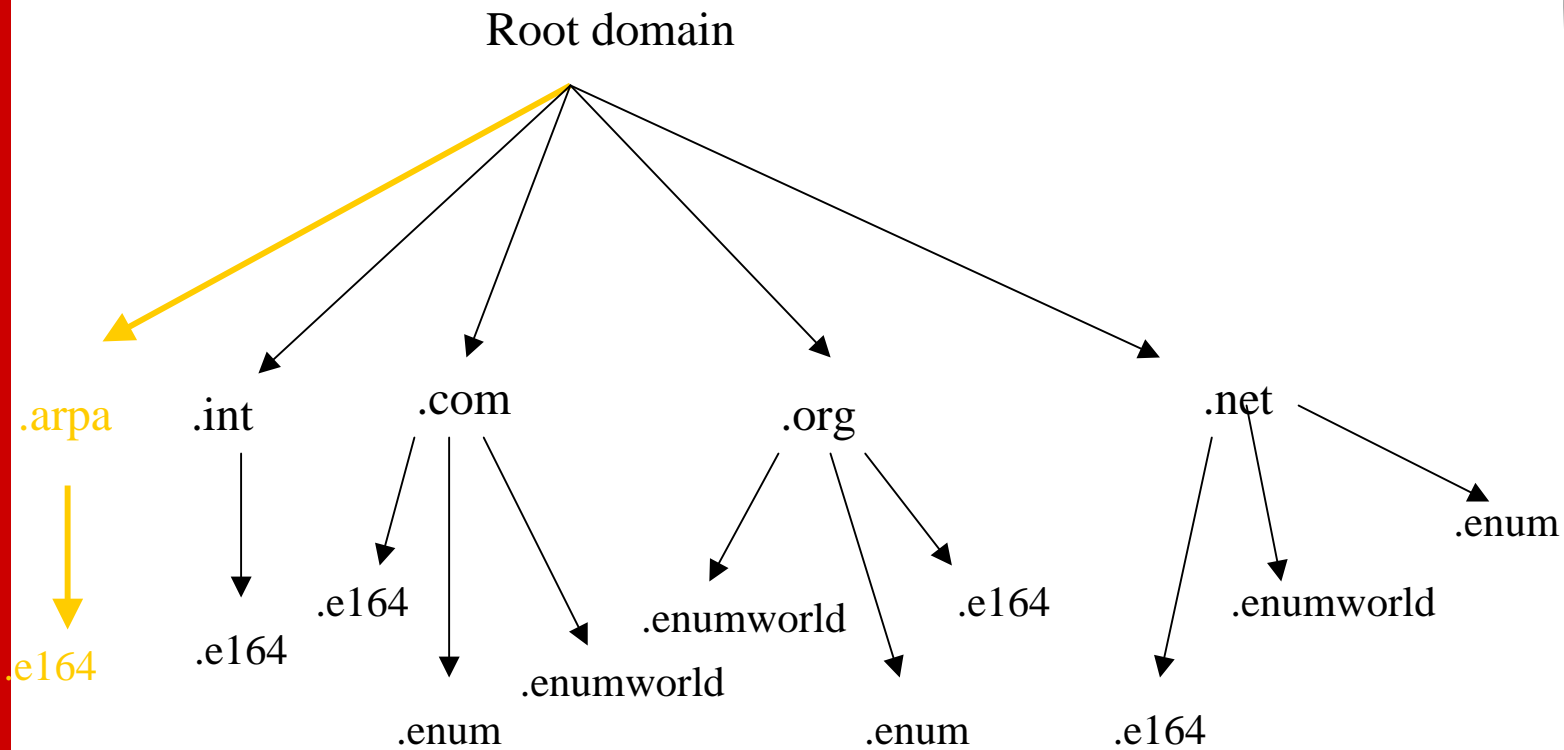
State involvement in permanent ENUM – legal regulation?

- Why should the Member state/NRA support one ENUM solution according to IETFs intentions if the market will be fragmented by many "ENUM-like" functions? – maybe a non-problem now?
- State involvement **nessecary** for delegation of domain .6.4.e164.arpa - (TLD Solutions in UK!).
- State is the Manager for the country code zone (ENUM CC level)
- ENUM Tier 1 Manager designate ENUM Tier 1 Registry – normal Internet procedures (*i.e. Manager designate Registry*)

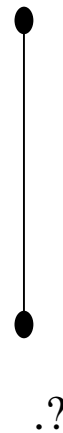


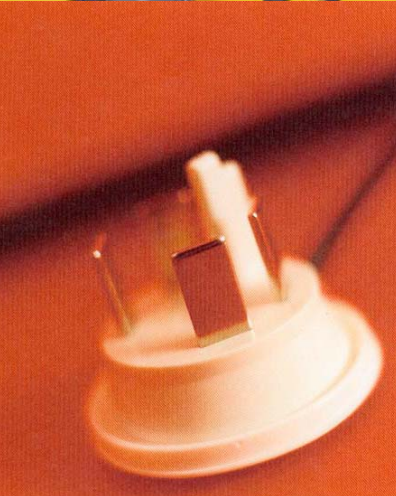
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Domain name tree (DNS)



Alternative domain name trees



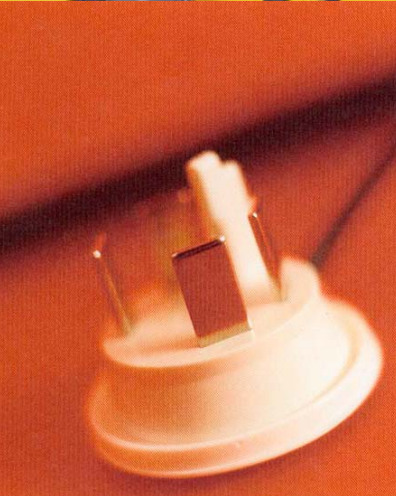


State involvement in permanent ENUM – legal regulation?

- The State will with ENUM have operational responsibilities for functions in electronic communications networks – this is a consequence of the rules when requesting delegations of ENUM country code zones according to IETF, ITU, IAB, RIPE NCC-procedures **and** the way DNS works...
- This operational responsibility is common in the Internet world (ICANN->Root servers, ccTLD-Managers->ccTLD Registry), but might be a new challenge for a State that previously only had *administrative* responsibility for the national E.164 numbering plan



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State involvement in permanent ENUM – legal regulation?

- Will IAB or RIPE NCC (ENUM Tier 0 Registry) charge the State/ENUM Tier 1 Registry in the future for the made delegations
- No countries have yet done any in-depth studies how the state involvement, direct/indirect, would look like based on present ITU Interim procedures/comming E.A-ENUM
- State involvement for the integrity of the E.164-numbering plan – store E.164 numbers in DNS – very important that the same subscriber has both the E.164 number and corresponding ENUM domain name
- *Permanent commercial operation of ENUM – need legal regulation for some parts*



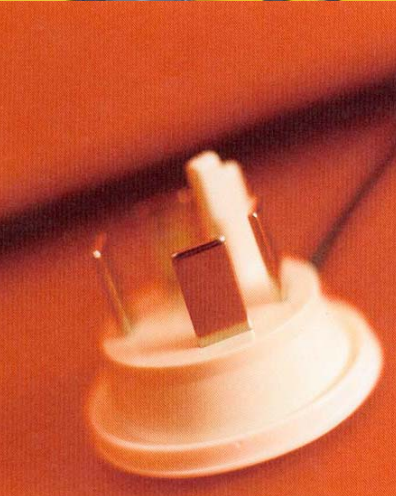
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State involvement in permanent ENUM – legal regulation?

- **Permanent** ENUM Tier 1 Registry
- **State** decides who will act as *ENUM Tier 1 Manager* – could be the Administration (NRA) or someone else...
- If it will be the NRA, it has to designate who shall be the *ENUM Tier 1 Registry* through some form:
 - **Decision**
 - **Licence**
 - **Concession**
 - **Agreement**
 - **Public procurement**
 - *Other form?*
- Finance of Tier 1 Registry? – state, user, Registrar pays



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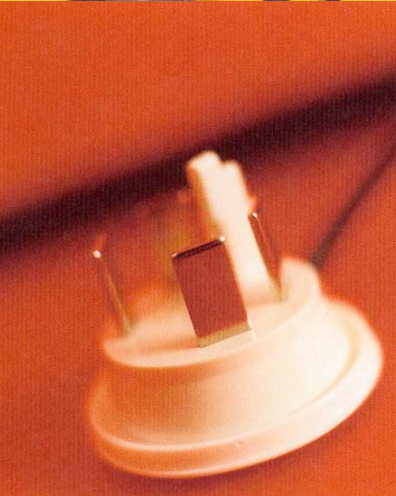


ENUM and self-regulation

- Opportunity for the market
- Experience from Sweden – ENUM needs some form of rules – either legal- or self-regulation (MoU, Code of Conduct etc.)
- Some players from the Internet community dislike rules/regulations in any form
- No progress in this area
- *Studies of legal regulation of .se is going on in parallel – no formal view from the government yet*



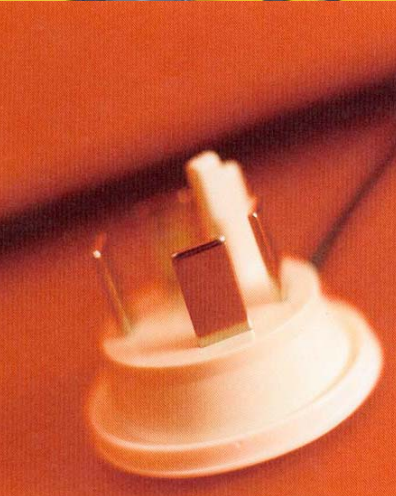
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Privacy aspects of ENUM

- Consent from the ENUM subscriber is necessary for registration of the ENUM domain name that corresponds with the same subscribers E.164 number
- Regulated in the agreement between PTS and ENUM Tier 1 Registry during the trial
- Unlisted (ex-directory) numbers excluded from the trial
- Personal integrity – how to withhold that in the DNS?
- *Privicay matters – not a favourite topic for some Internet players*

- IWGDPT – Privacy paper to ITU-T SG2
- ETSI TISPAN – will study privacy aspects of ENUM

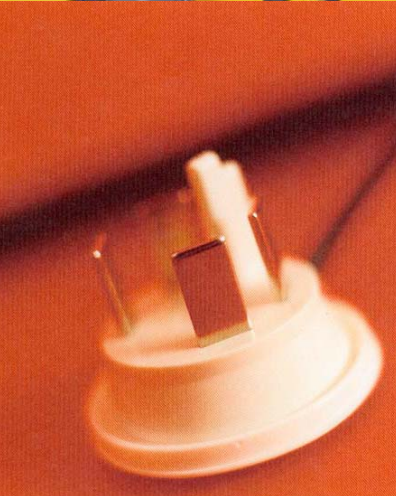


Commercial aspects and the future of ENUM and other "ENUMs"

- We think that many commercial players don't yet see business cases in ENUM – therefore the general low interest in ENUM
- ***User ENUM (according to RFC 2916bis)***
- Service/application for the one who calls (*calling user*) - "directory enquiry/web search functions"?
- Service/application for the one who wants to be reached (*called user*) - "real time service"?



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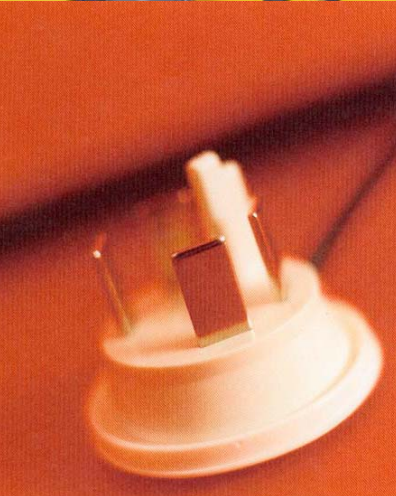


Commercial aspects and the future of ENUM and other "ENUMs"

- ***Infrastructure/enterprise ENUM (maybe not strictly according to RFC 2916bis?)***
- Routing function between different electronic communications networks?
- Routing function inside one operators network?
- Routing function for private networks/enterprise?
- Routing function for 3G-networks for some services, e.g. MMS?
- New imlementation for number portability?



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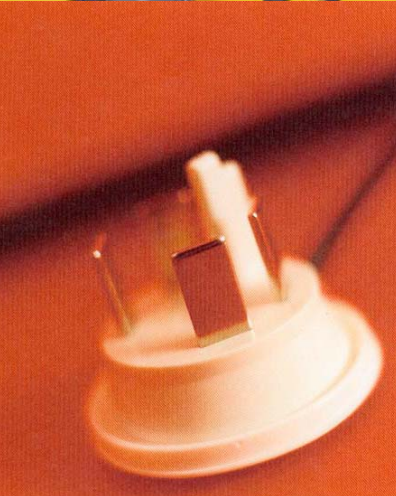


Next step in Sweden

- *ENUM still an interesting function for convergence*
- Continue trial to 2004-05
- PTS produce final report to Government 2004-06-30
- Make decisions what further activity will be – *bury ENUM or commercial introduction*
- *Probably "last chance do dance" for ENUM when it comes to supporting initiative from the Government for ENUM trial in Sweden...*



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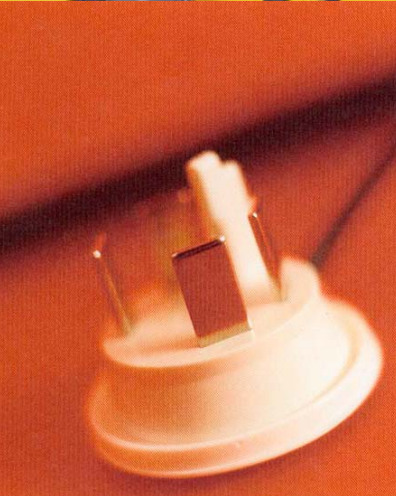


Some open questions and conclusions

- The first question – will ENUM be a hit – it's still in the innovation phase
- ENUM – store E.164 numbers in DNS – very important that the same subscriber has both the E.164 number and corresponding ENUM domain name – i.e. the integrity of the E.164 numbering plan – **procedures for validation and on-going checks must be available – legal regulations or self-regulation?**
- Involvement of the state/NRA according to ITU interim procedures and forthcoming ITU-T Recommendations (draft E.A-ENUM) – **it's a fact** – how much needs legal regulation?



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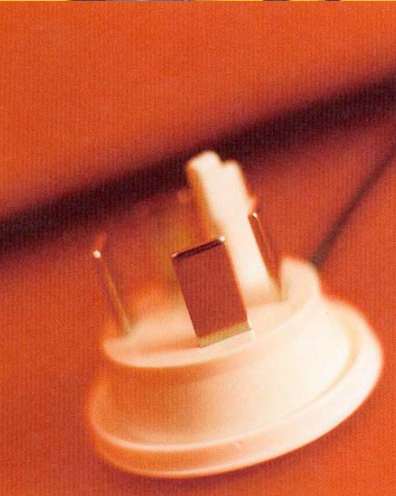


Some open questions and conclusions

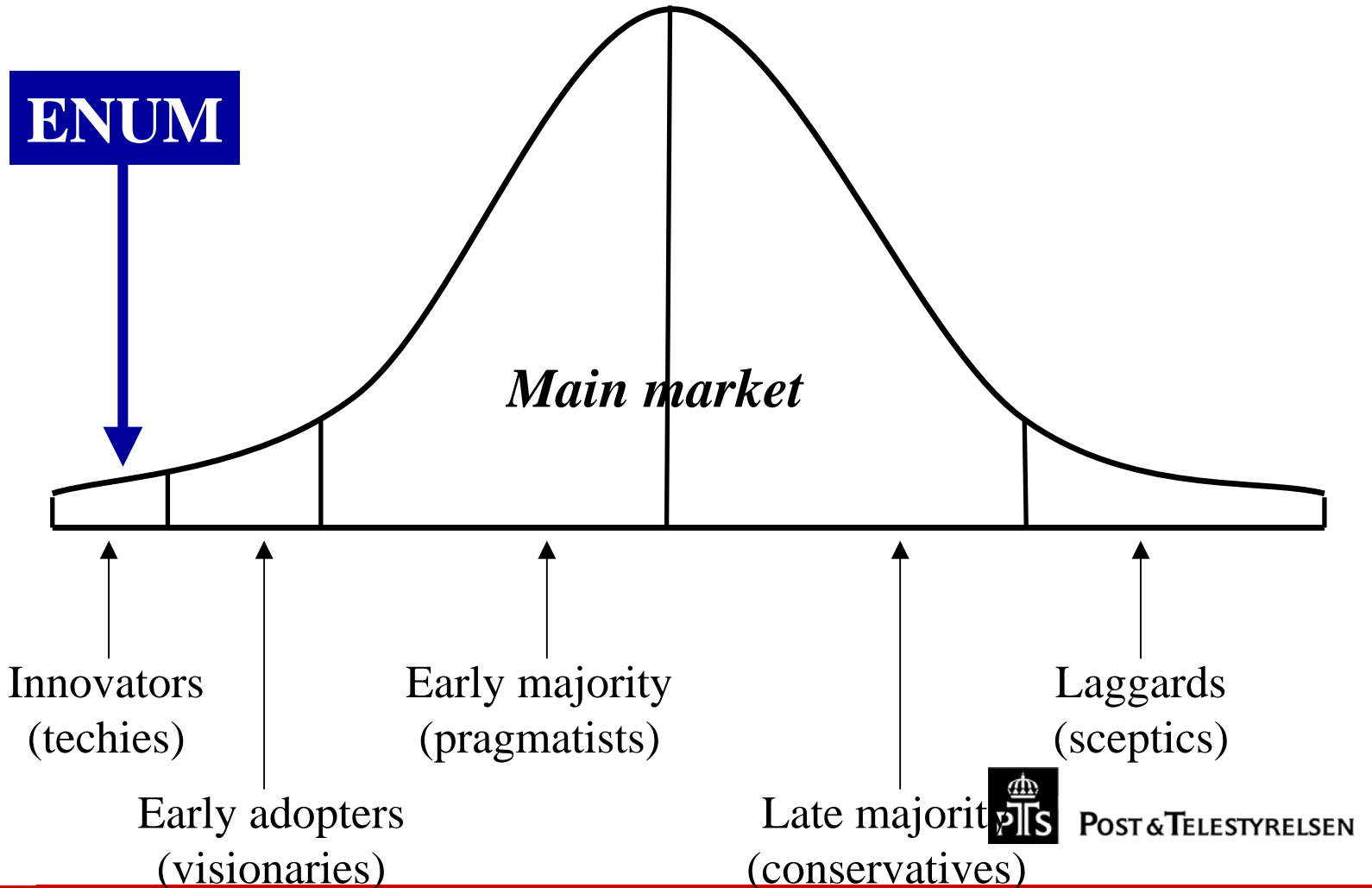
- Indirect **operational** responsibility for functions (**associated facility**) in the electronic communications networks for the state for the national ENUM domain cc.e164.arpa
- The choice of the ENUM Tier 1 Registry
- How long will RIPE NCC be "free of charge" running the ENUM Tier 0 Registry
- The TLD-question in ITU – will there be an application to ICANN – will it be accepted? – this a non-problem for the "IETF/IAB"-world
- ENUM – starts question who decides over the Internet (US DoC (??))
- EU – investigating the area via a study by Political Intelligence – further actions?



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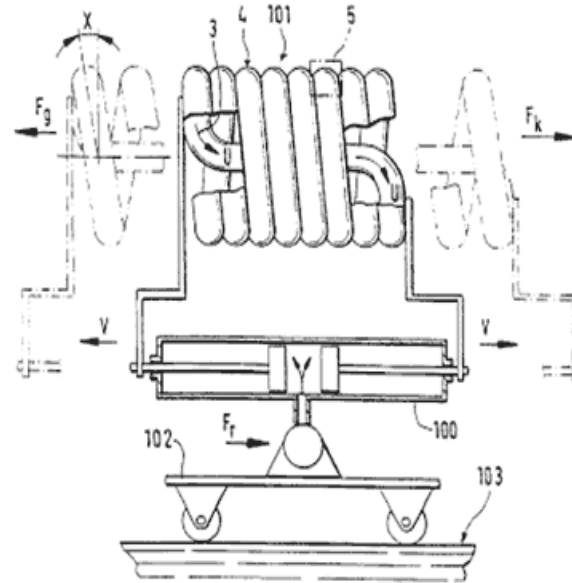
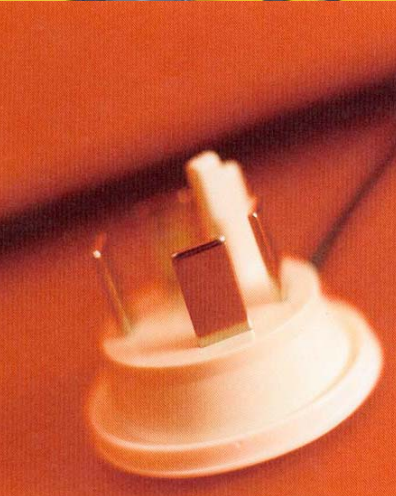


Technology adoption life cycle





The killer application for ENUM



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