



# ENUM: Use Cases

Klaus Darilion

[klaus.darilion@enum.at](mailto:klaus.darilion@enum.at)

# Introduction enum.at GmbH



- ENUM registry in Austria (+43)
  - Contracted by regulator (RTR)
- World's first commercial ENUM registry (09.12.2004)
- Offers services to "registrars" (mainly Internet Telephony Service Providers)
  - No direct registrations by end customers
- Affiliated to nic.at (Registry of .at ccTLD)

# Use Cases



- interconnecting SIP enabled PBXs
  - inside your company
  - with other parties
  - case study Pöttinger Corporation
  
- +43 780 number range in Austria
  - ENUM based
  - direct routing

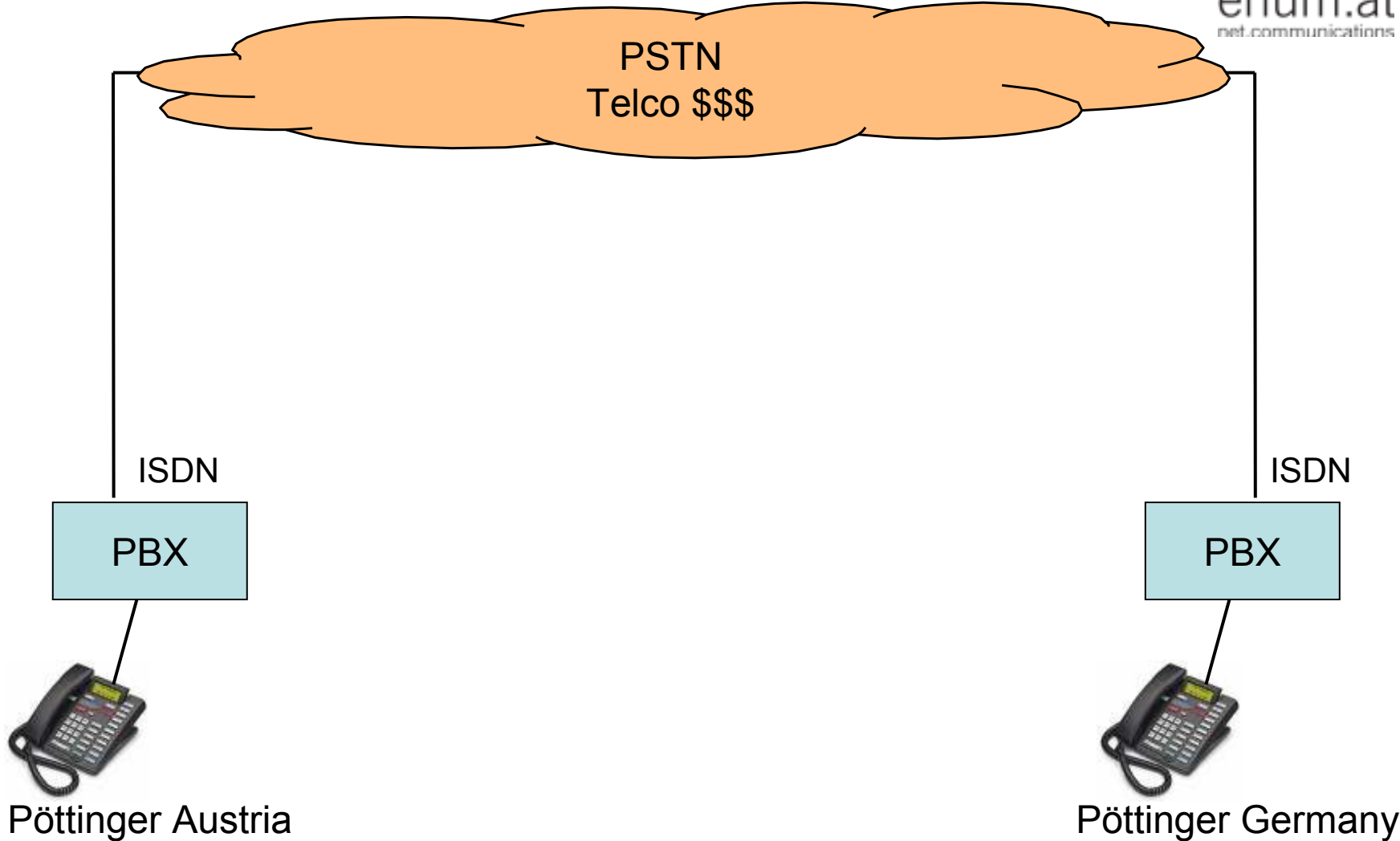


# Interconnecting SIP Enabled PBXs



- Pöttinger corporation
    - manufacturer of agricultural machinery
    - offices and facilities worldwide
    - ~1000 employes
    - lots of phone calls between their branches
    - good Internet connectivity at all sites and VPN
- wish to use VoIP for toll bypass

# Big Picture – Before



# Pöttinger: VoIP Requirements



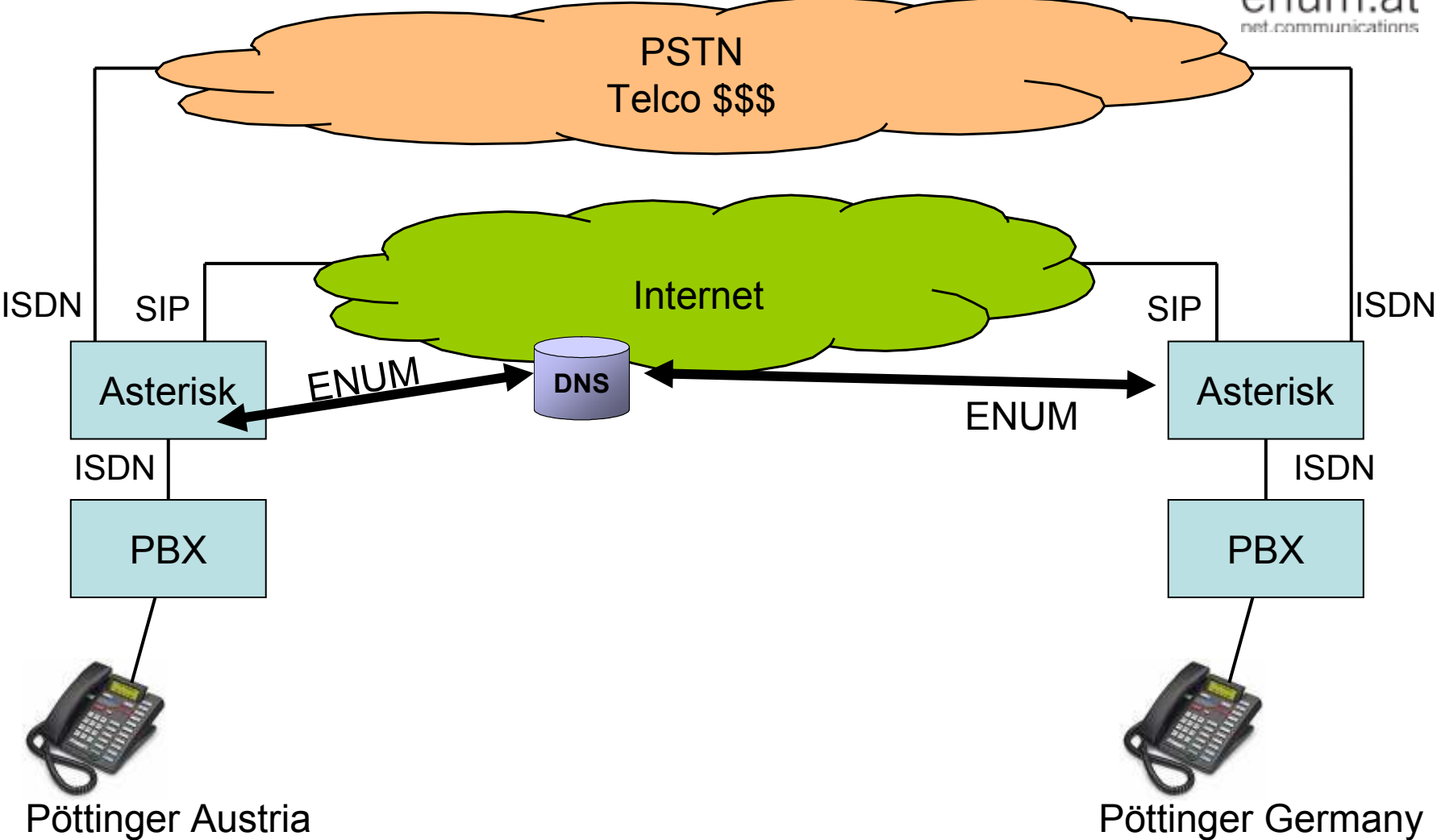
- reuse existing legacy PBXs
  - people are used to the phones
  - no big investments
- branche offices must operate autonomous
- use VoIP also for external phone calls
  - if callee is VoIP enabled
  - allow incoming VoIP calls
- use VPN for internal calls

# Solution

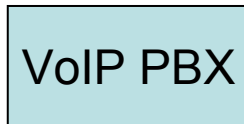
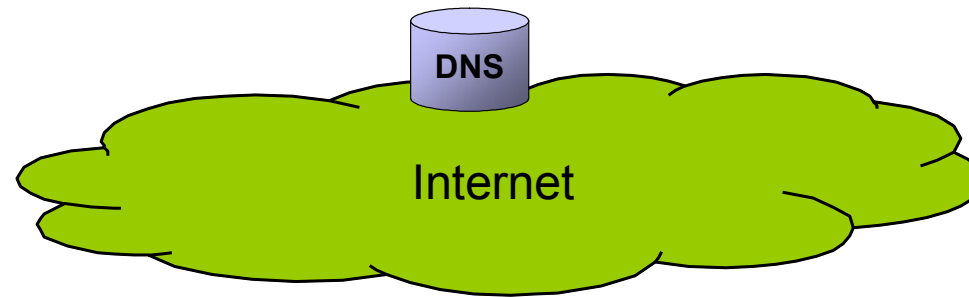


- ENUM based routing
  - Austria, Germany, Czech Republic
- Asterisk (open source telephony) as
  - PBX
  - ENUM Client
  - ISDN-SIP Gateway

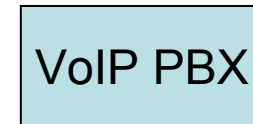
# Big Picture – After



# Adding Another Site



Pöttinger Austria



Pöttinger Germany



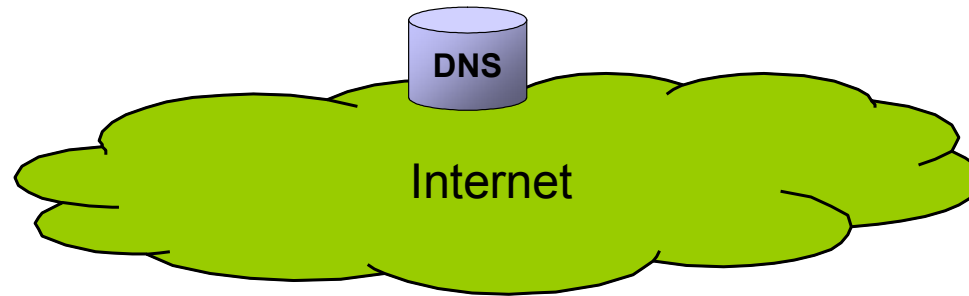
# Adding Another Site



new site: Pöttinger Germany 2

VoIP PBX

← 1. setup new site



VoIP PBX

Pöttinger Austria

VoIP PBX

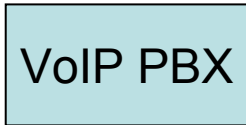
Pöttinger Germany



# Adding Another Site

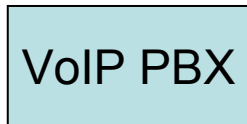
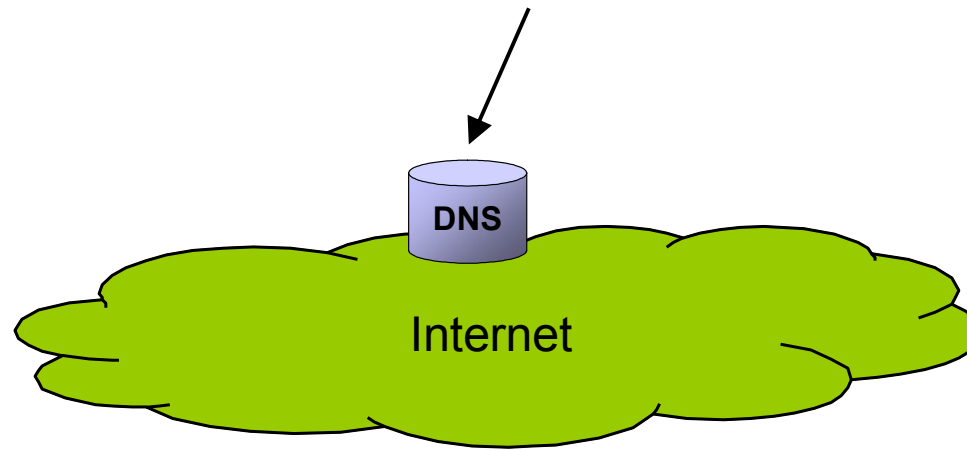


new site: Pöttinger Germany 2

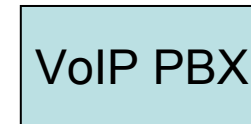


← 1. setup new site

2. provision ENUM (DNS)



Pöttinger Austria



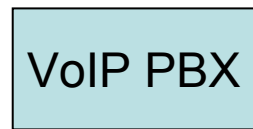
Pöttinger Germany



# Adding Another Site



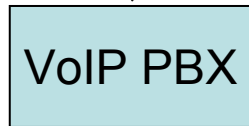
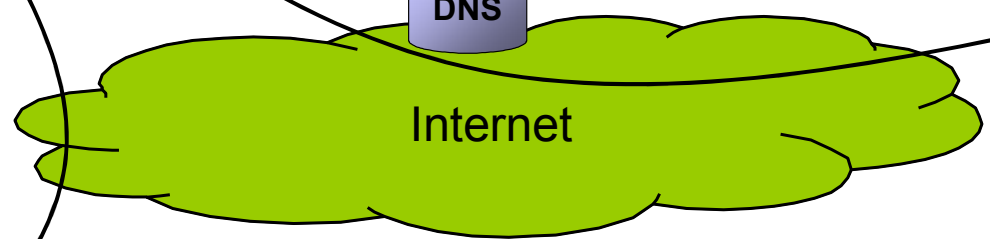
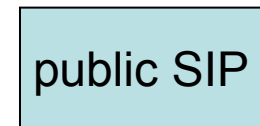
new site: Pöttinger Germany 2



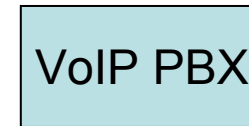
1. setup new site

2. provision ENUM (DNS)

3. receive calls



Pöttinger Austria

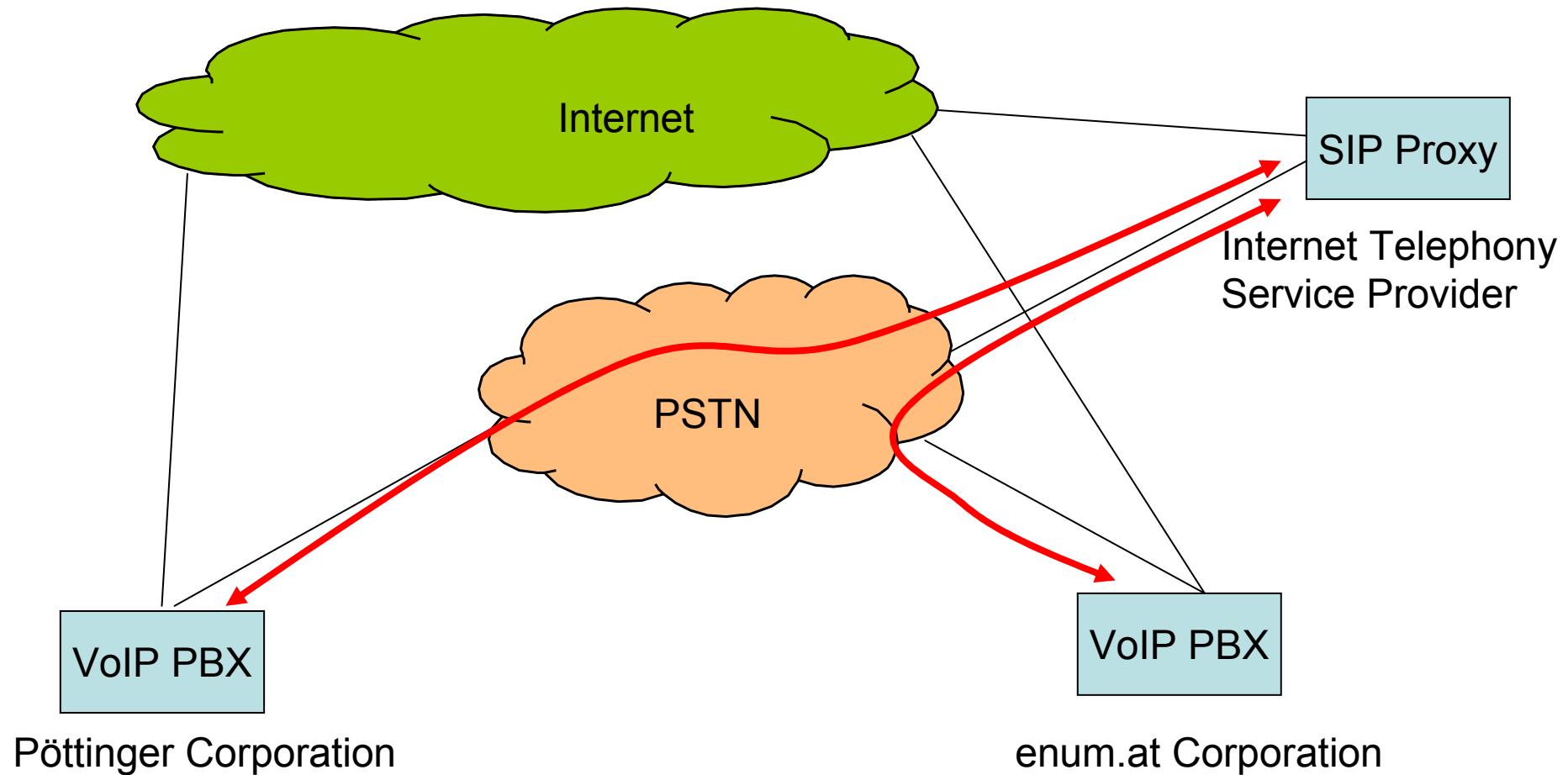


Pöttinger Germany

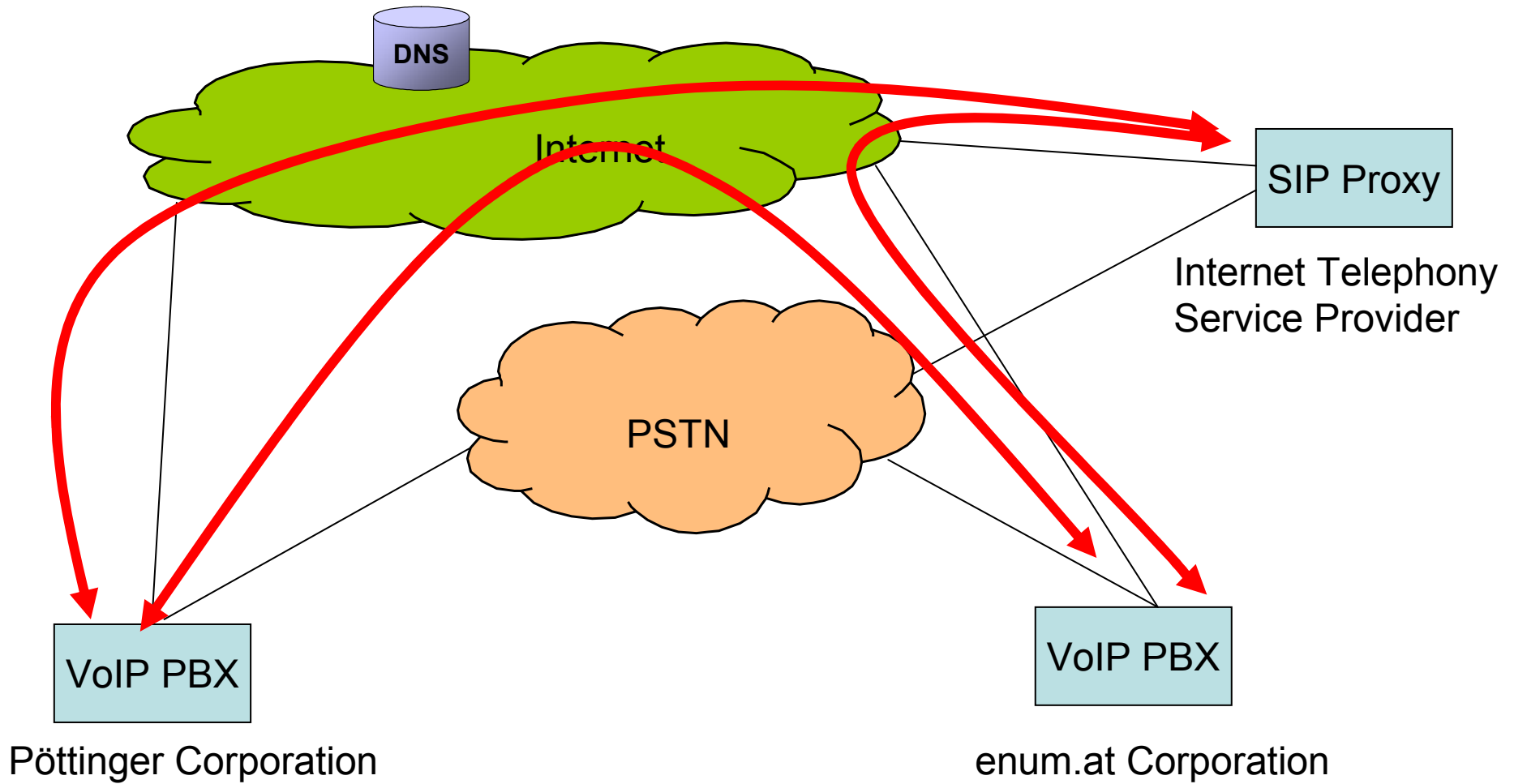
no need to touch other sites – calls get automatically routed to your new site via SIP



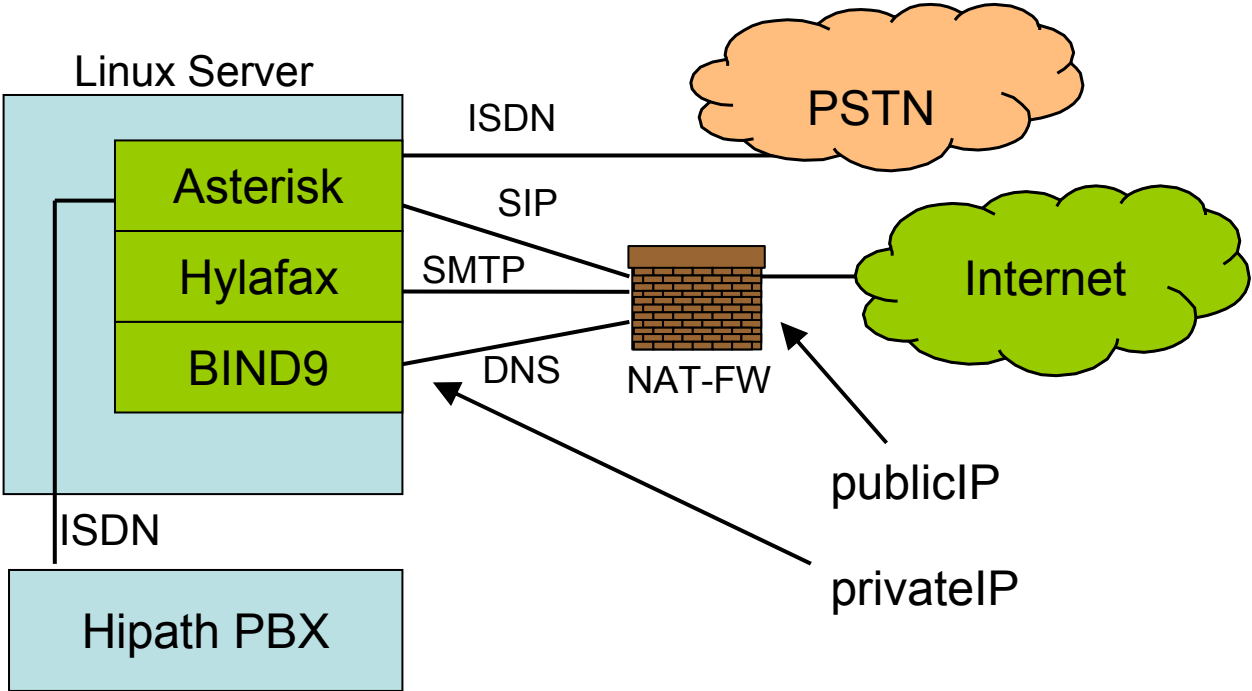
# Interconnect Without ENUM



# Interconnect With ENUM



# Detailed View



Hipath PBX  
e.g. Pöttinger Austria

Asterisk: ENUM client, ISDN-SIP GW  
Hylafax: fax server solution  
Bind: name server for ENUM domains



# Costs



- hardware per site
  - 1 Linux Server
  - ISDN interface card
  - some cables
  - (optional ISDN failover switch)

# Other Routing Solutions



- static routing
  - new site or changes need updates in every other site
  - laborious
- central routing node
  - sites should be autonomous
  - how to link up with external VoIP nodes
- private ENUM tree
  - should be useable to/from external parties too



# +43 780 number range



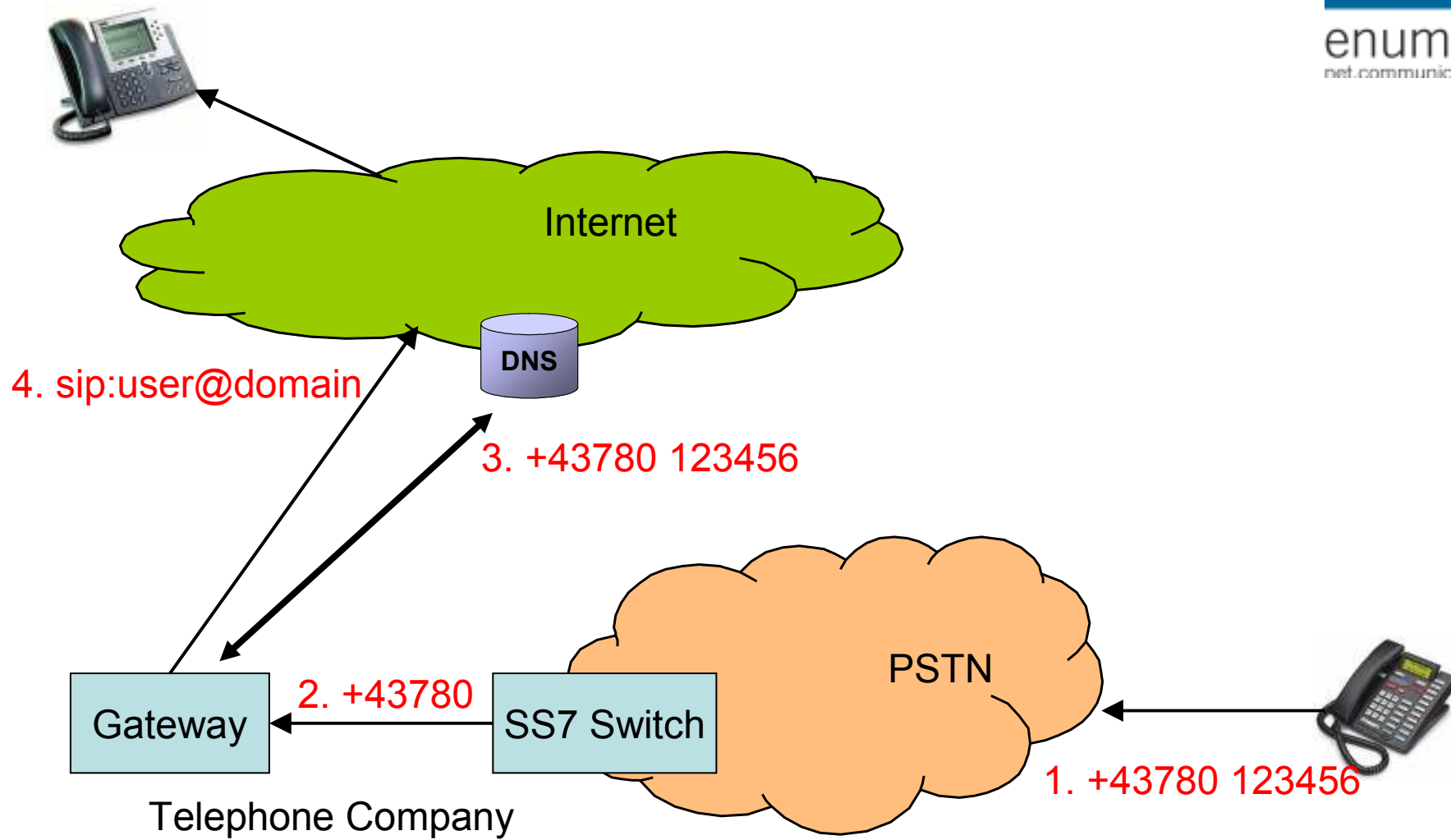
- number range for convergent services (not necessarily telephony)
- delegation of the corresponding ENUM domain is a requirement for assigning numbers (number follows the ENUM registration)
- routing based on ENUM

# ENUM Registration



- traditional
  1. phone number (block delegation to telco)
  2. customer has “right to use” this phone number
  3. customer is allowed to register the ENUM domain of its phone number (validation)
- +43 780
  1. customer registers ENUM domain
  2. customer gets the “right to use” this number (pseudo validation)

# +43 780 Routing



# +43780 Use Cases



- vanity numbers (customer can choose)
- easy to setup a telephony service (no monthly charges for PSTN connectivity)
- virtual Austrian phone number (internationally reachable)
- currently 2 gateways
  - Telekom Austria (incumbent) & Colt

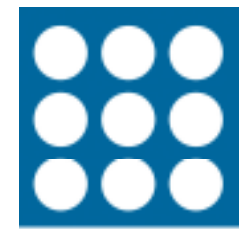
# The End



- This was
  - interconnecting SIP enabled PBXs
  - +43 780 number range in Austria

Thank You





enum.at  
net.communications



# Appendix



# Klaus Darilion



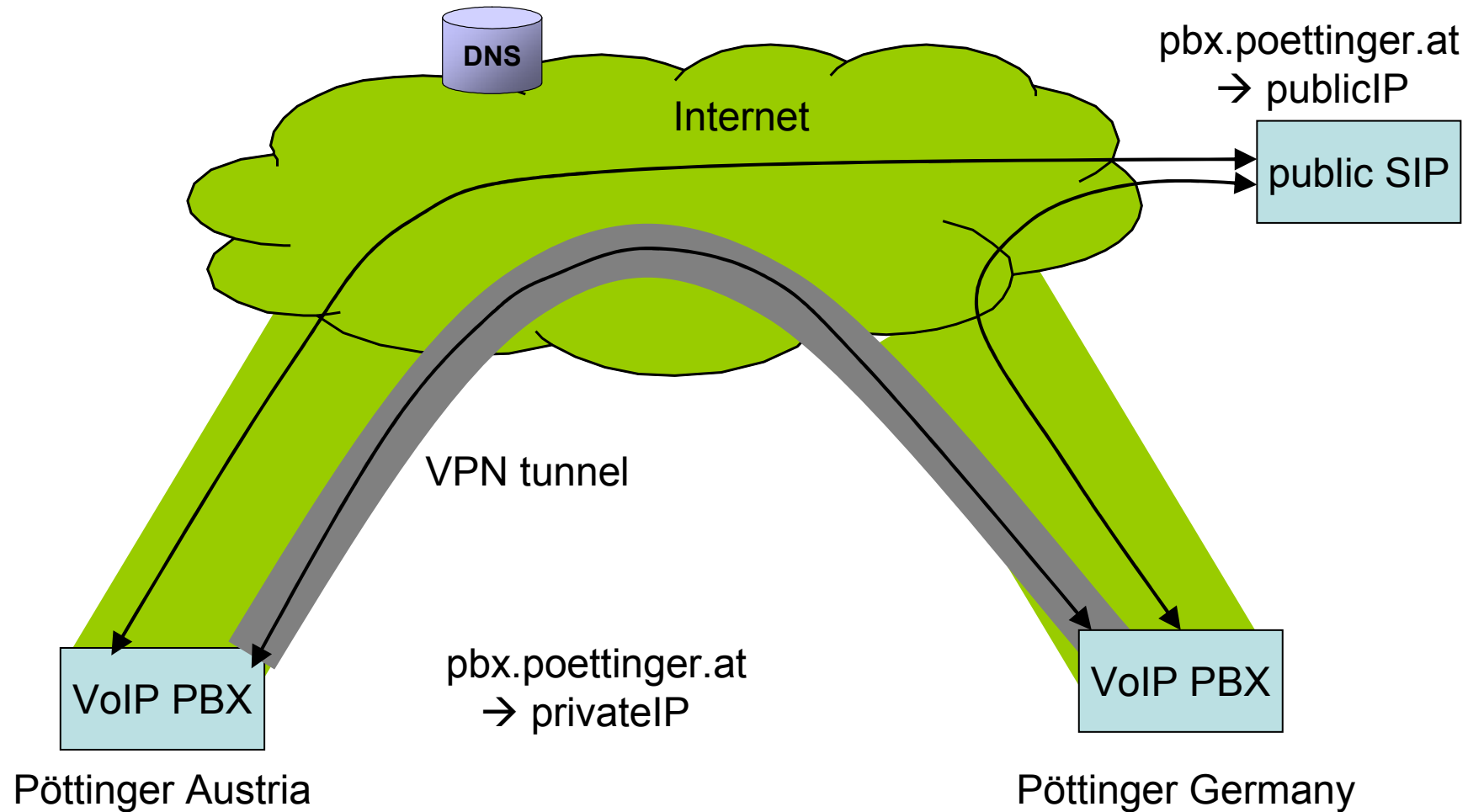
- system engineer for nic.at/enum.at
- in VoIP business since 2001
- development of ENUM/VoIP technology
  - openser, ser SIP proxy
  - Asterisk opens source PBX
  - office integration
- consulting for VoIP, ENUM, SIP security



# Pöttinger: Use VPN internally → split DNS



+437248600 → sip:0@pbx.poettinger.at



# Pöttinger: why ENUM



- why ENUM
  - to only feasible way to find other VoIP enabled parties
- why e164.arpa (official public tree)
  - guaranteed validation mechanisms
  - → private public trees are not safe  
e.g. +43800800888 (nic.at)  
e164.org: → sip:43800800888@selfnet.at  
who is selfnet.at??? can intercept the calls

# +43 780: PSTN Routing



- traditional
  1. phone number belongs to number block
  2. originating telco routes the call to terminating telco (the number block holder)
  3. terminating telco routes the call to the customer
- +43 780
  1. originating telco detects +43780 number range
  2. originating telco performs ENUM lookup
  3. originating telco routes call to customer per SIP

# +43780 Gateways



- currently 2 gateways
  - Telekom Austria (incumbent)
  - Colt
- minimum requirements (SIP+G711)