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ENUM - Introduction and Impact

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Why ENUM?



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Communication models



How do you control your receipt of email?

- Advertise which servers receive mail
 - single, global, low-cost directory - the DNS
- Specify priority order for servers
- Control what mail to accept
 - Black lists, white lists, reputation scores etc

Of course, this is the Internet

- Only pay for flat rate access - no per email charge
- Choose whether to connect via ISP or implement ISP-grade infrastructure

Contrast this with the PSTN



Calls in a pre-VoIP world

- Control on incoming calls is via Communications Provider (CP)
 - Limited user call control
 - Call routing and forwarding is managed and charged by the CP
- Pay for rental and call charges



How do ENUM and VoIP change this?

Gives you control of your telephony

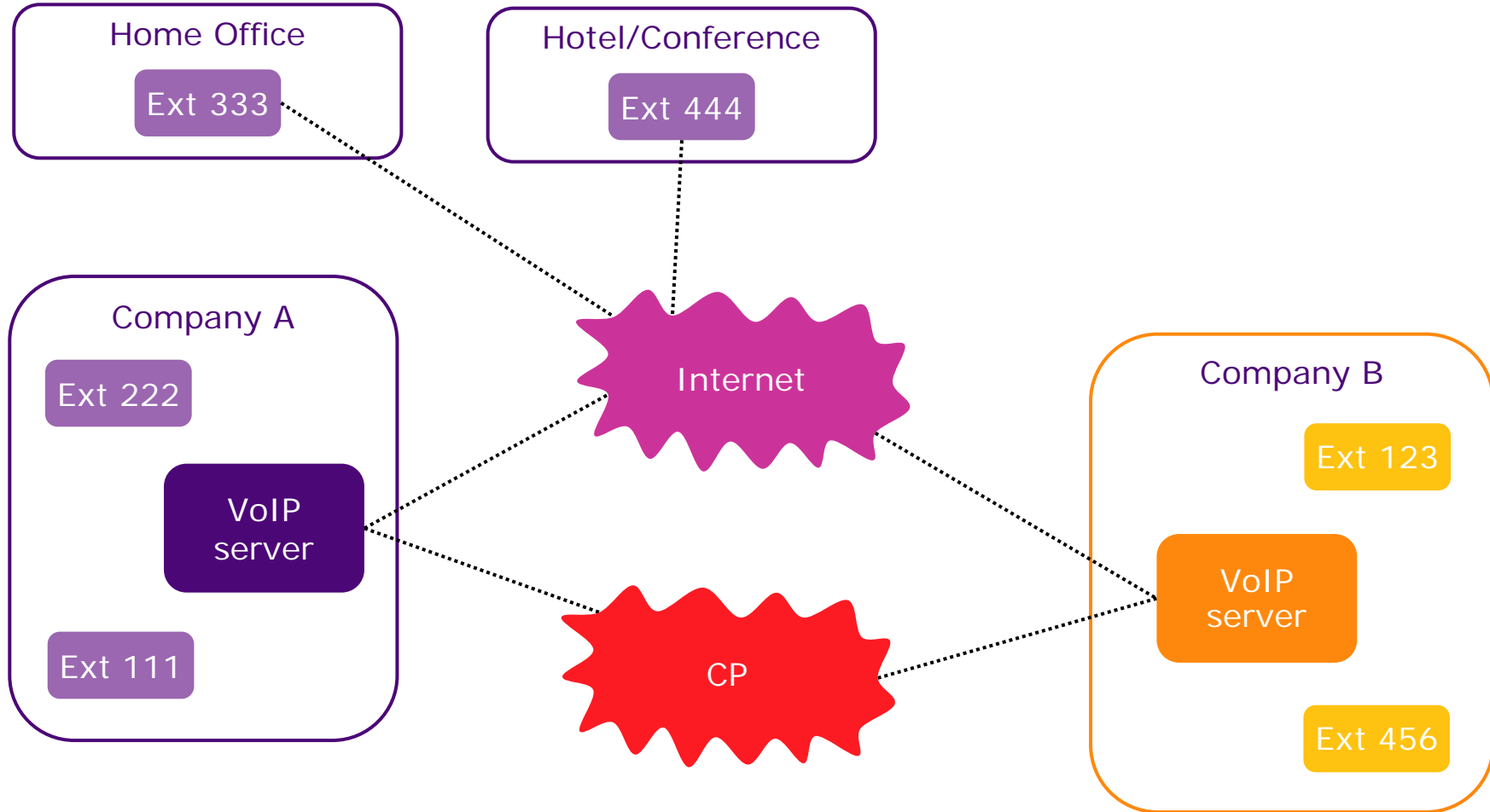
- Your callers don't necessarily pay call charges
- You control what incoming calls to accept
 - Black lists, white lists, reputation scores, etc
- You choose how to mix ENUM and ordinary CP services
- You advertise what servers receive calls for what number and with what technology
 - Single global, fault-tolerant directory - DNS
- You choose how to connect your servers to the Internet
 - Locally, hosted, outsourced
- You can change your connectivity as and when you want

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A common scenario



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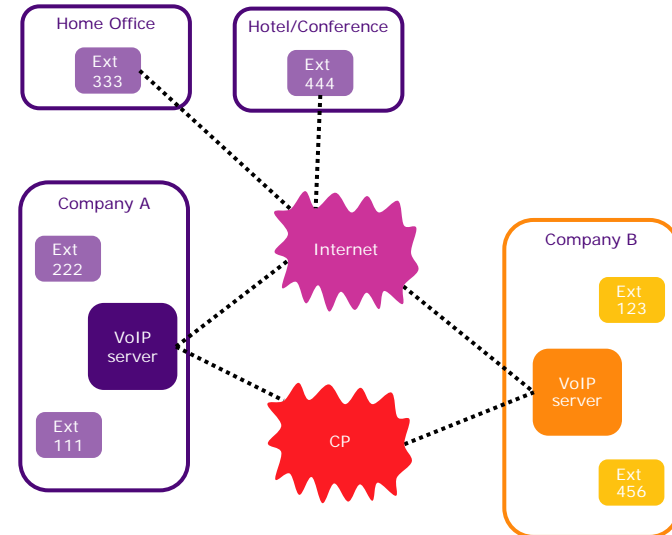


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A common scenario



- Company A wants to talk VoIP to company B. It needs to know
 - Does B have a VoIP server?
 - What protocols does it support?
 - What is its IP address?
- With that info:
 - call across the Internet
 - no call charges, just line rental
- Without it:
 - has to call via a CP
 - pays call charges
- Can pre-configure server, but does not scale.
- Need one way to look this up, for all telephone numbers.





ENUM is just a part of DNS

- Step 1: turn telephone numbers into domain names:
 - Special domain names to represent numbers
 - 01865 332211 >> 1.1.2.2.3.3.5.6.8.1.4.4.e164.arpa
- Step 2: advertise available services associated with those numbers
 - Special DNS records describe available services
 - What server, what protocol, what addressing
- These domain names and records are not meant to be directly used by people.
 - You still dial the number - device does the rest

A call using user ENUM



Much like email

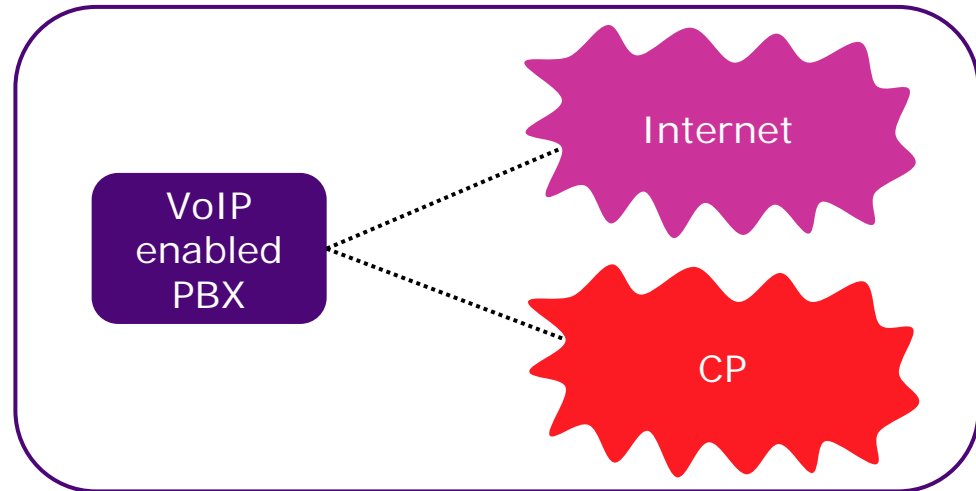
- You dial a number, same as before
- A device on your network turns it into a domain name
- Then it looks up the VoIP servers advertised on that domain
- Finds a match for supported VoIP protocol (e.g. SIP)
- Make the calls directly to receiving server across the Internet
- No CP !
- User ENUM is about end user of telephone numbers controlling those numbers

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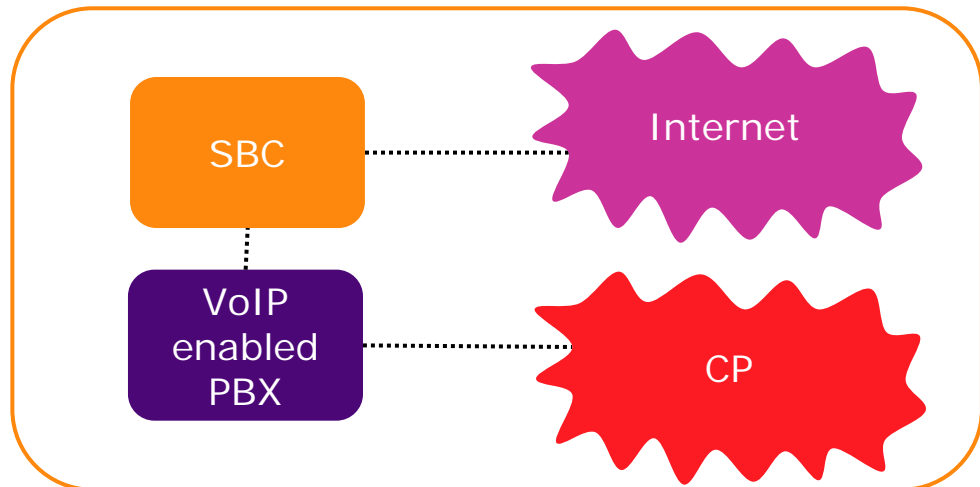
Local configurations



- Directly connected VoIP server
 - e.g. Asterisk



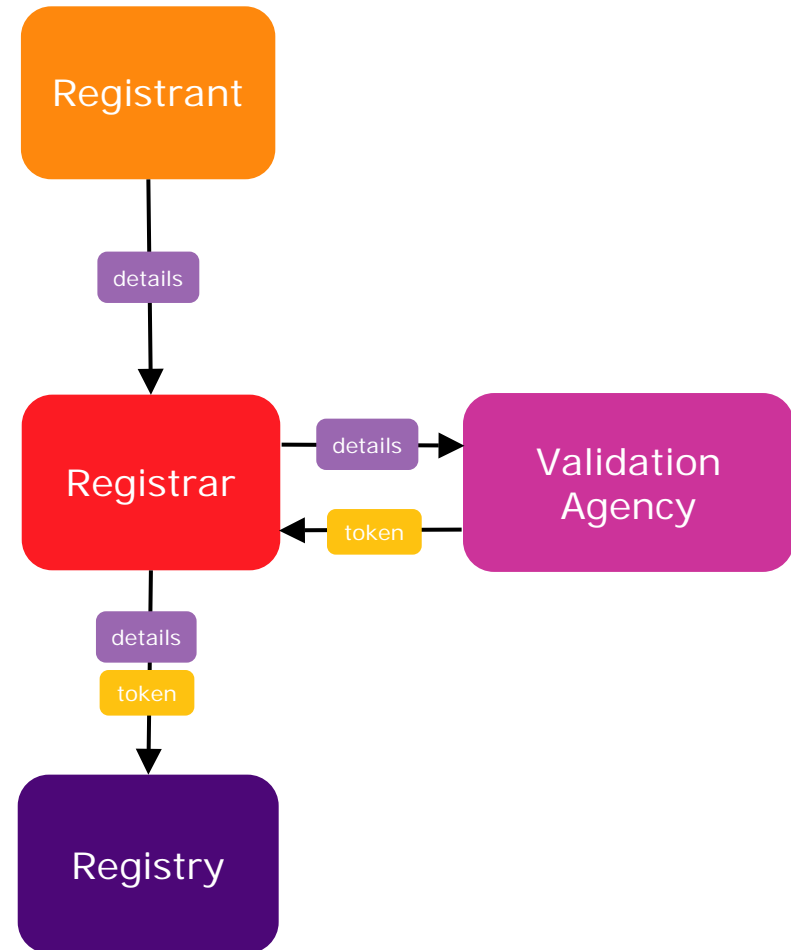
- Session Border Controller in front of VoIP server
 - SIP Proxy
 - Mix and match
 - “Enterprise” strategy



Registration process



- Registrant supplies details to Registrar
- Registrar forwards them to Validation Agency (VA)
- VA checks ownership of number - replies with token
- Registrar sends request to Registry with VA token
- Registry creates registration - for one or more numbers
- Registry delegates numbers in 4.4.e164.arpa zone



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Impact



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Shift to data



- Flat fee data is now common:
 - Broadband the best known example
 - Even 3G operators do fixed price packages
- Why treat voice differently?
 - Any other application charge per minute for connectivity (not content)?

BUT - This will take time

- Don't expect GSM or PSTN to die soon

Impact on VoIP CPs



- Skype
 - Free call proprietary intra-network
 - Pay for inter-network
 - Skype user name is free - takemeseriously@skype.com
 - But telephone numbers cost money
 - Inside Skype free, outside Skype pay
- Joining up islands of VoIP
- Small providers already interconnect for free
 - Call Sipgate from Gradwell - dial **777 + number
 - Call Iptel from Sipgate - dial 000477 + number
- Lower barrier to entering the market
 - Before ENUM proposition was intra-network savings - requires a huge network
 - After ENUM proposition is inter-phone saving - network independent.

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Other flavours of ENUM



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Infrastructure ENUM



- Private ENUM trees used by a carrier for call routing - no registry involved.
- Very different scale to public DNS
 - Below 10ms response time, always
 - Hundreds of millions of ENUM domains
 - ENUM servers in their data centres
- Very big business at the moment
 - Specialist DNS suppliers
 - Peering exchanges
- Standard being discussed at IETF
 - May designate new tree for this e.g. e164c.arpa
 - May be public tree but private connections

Central Numbering Database



- UK designed central call routing database
 - Every UK telephone number in time (~800m)
 - Queried for every call
 - All major CPs will keep a full copy locally
- Uses ENUM as a core technology
 - Private database not related to user ENUM
- Massive impact on supplier market
 - Huge capital investment by CPs
 - Huge opportunity for vendors - who must support ENUM to take advantage
- Currently suspended whilst Ofcom re-analyse the business case



- Hybrid of Infrastructure and User ENUM - entirely UK specific
- Process
 - Carrier registers block of numbers with Registry
 - Registry checks ownership
 - Registry publishes NAPTR records not NS records
 - Choice of NAPTR records very limited
 - Overwritten by user ENUM registration
- What is it for?
 - Designed to populate user tree quickly
 - New carriers who are entirely IP/Internet based
 - Low cost services from incumbents
- Very low price as bought in bulk.

Applications



Ideas

- ENUM doesn't just store VoIP server details
- Can also hold:
 - Alternate telephone number
 - Postal address
 - Email address
 - Instant messaging address
- And all of this can change
 - Change as you move around
 - Change based on the time of day
- Dutch bank even considering using it for secure access !

UK ENUM

Benefits of ENUM



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- To enable other people to make free / lower cost calls to them
- To enable them to take greater control of how calls are routed to them

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Potential registrants



- Initially ENUM users will be large registrants
 - Enterprises that use freephone/low cost inbound numbers
 - Call centres for many service related industries
 - Enterprises with large supply chains
 - Supermarkets
 - Enterprises with multiple sites
 - Hotel chains
 - NHS
 - Police force
 - Education
 - Local authority

UK ENUM

Where are we now?



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- Launched on 12th March
- Growing registrar and validation agency channel
- Looking at software developer community
- Speaking to software and hardware vendors
- Working with UKEC and the ENUM Federation to promote ENUM
- Developing business cases and supporting the channel

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Any questions?



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Questions



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