

Making IP Video/Voice collaboration easier

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At the University of Michigan, research, and teaching and learning are enhanced and facilitated by advanced collaboration tools.



A cornerstone of the University's transformational IT initiative is the [Nextgen Collaboration project](#).



[Image from flickr](#): Some Rights Reserved by Nyaya Health

Today, most of the use is Google Hangouts and Skype for ad-hoc, travel reducing meetings.



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What we want are immersive HD video connected spaces.

What can we do with a fully IP enabled network of collaboration spaces?

Far flung groups, see true utility in High Definition (HD) video conferencing and Telepresence **today**:

- researchers working on the LHC globally
- nationwide professional classes at the Ross Executive MBA program
- local but dispersed development teams as for our Learning and Research Management System, **CTools**

But getting it to work is too hard!

Video collaboration is hard to do well and harder to use.



Voice is perceived to be easier, but we've had a lot more practice.

To be used more, Video collab needs to be at least as easy as voice.



E.164

E.164 is the way PSTN numbers are addressed

+1 (734) 615-7540 is my office phone's address.

Calling a "room" video unit should be as easy

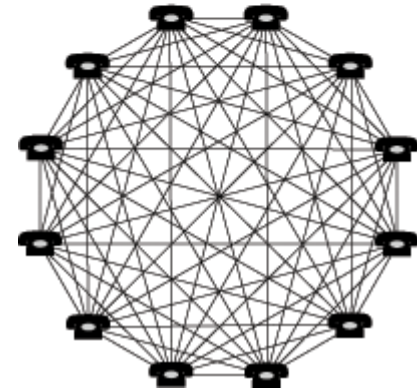
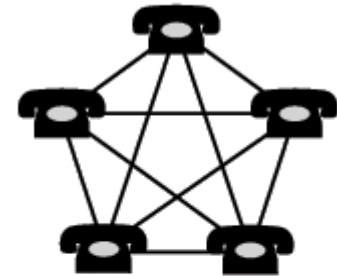
use E.164 for IP Voice/Video

ENUM is an effort to map E.164 into the DNS so IP connected systems can use that familiar paradigm to dial.

We like using familiar paradigms to make it easier for end-users! They would much prefer to dial a phone number than an IP address or SIP URI.

The network effect

The more end-users on the network that can reach each other, the greater the value of the network.



Why UM deployed NRENum.net



- It solves the dialing problem
- It is collaborative and community owned
- It works today with inexpensive and well-supported tools
- We can support more than just HD video

What can you reach at UM using ENUM?

- All our VoIP handsets are natively reachable via NRENum.net!
- All our Telepresence/room video units are natively reachable via NRENum.net!
- All our non-VoIP handsets and devices will be reachable via ENUM via a RTP bridge
- Ready for the future when our TDM switch is retired.

Inbound Video/Voice call routing

2. SIP proxy sends query to DNS server to see if ENUM routing is available:
 query NAPTR 0.4.5.7.5.1.6.4.3.7.1.nrenum.net. ?
 format is reversed e164 number with leading country code but no +



DNS server

3. If exists, sends back sip URI rewrite rule for ENUM:
 ie. "!^(.*)\$!sip:\\1@enum.voice.collab.it.umich.edu!"



4. SIP proxy sends INVITE to
 sip:+17346157540@enum.voice.collab.it.umich.edu



5. enum.voice will see if INVITE is for a number we host, if so use a SIP trunk to send



9.0 Video Call Manager

6. If device is registered, will ring, ready to answer and if codecs can be negotiated, video will show



141.213.255.251

1. call 17346157540
 SIP proxy will rewrite to +17346157540



192.0.2.13

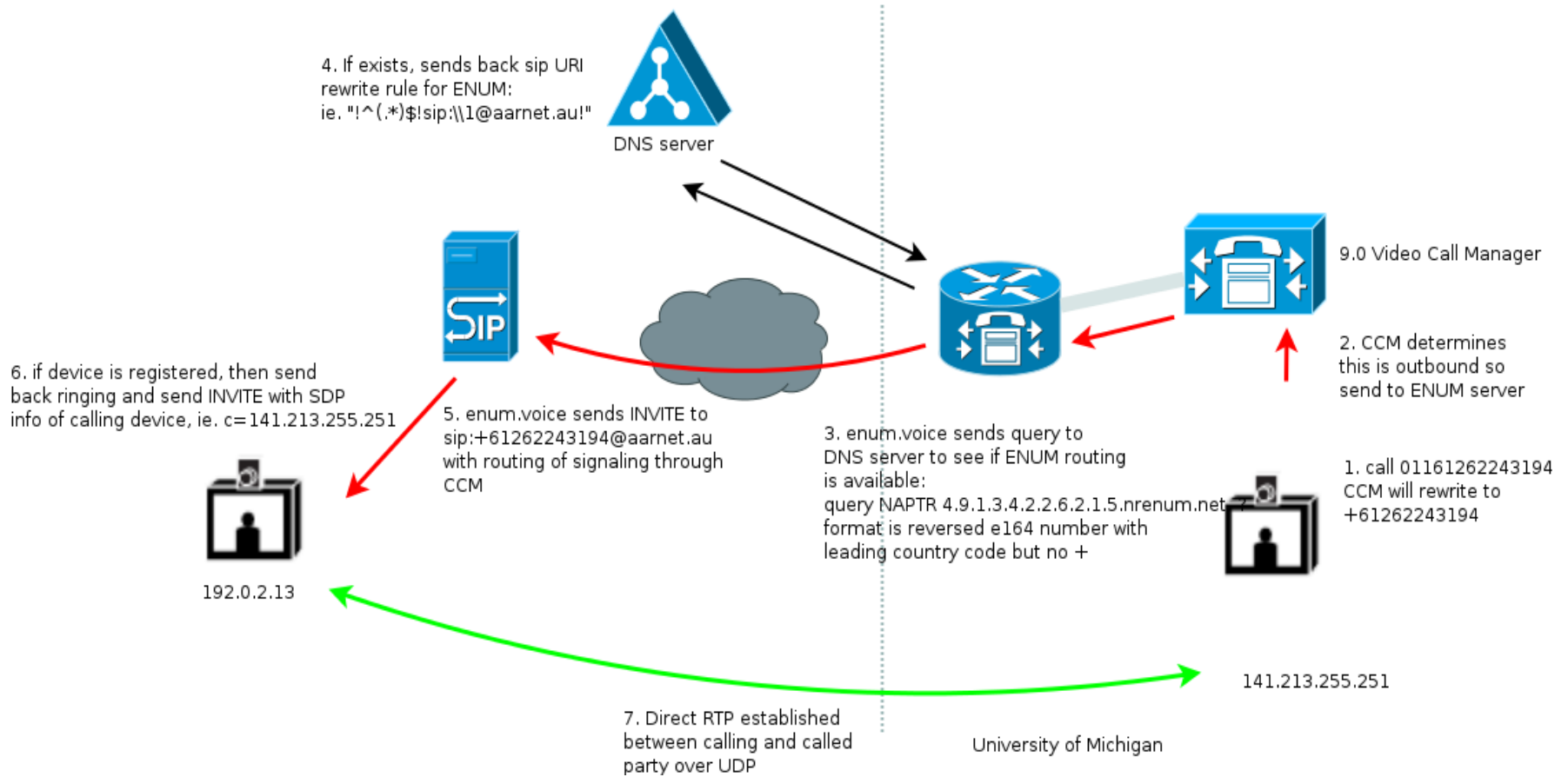
7. Direct RTP established between calling and called party over UDP

University of Michigan

What can UM endpoints reach using ENUM?

- Any endpoints worldwide that are listed in **NRENum.net** or the **e164.arpa** tree are reachable from all IP endpoints (VoIP handsets, Telepresence units) registered to the ITScomm call managers.
- We have automatic fallback to the PSTN for calls made to numbers that are not listed in ENUM, so the experience is seamless from the end-user perspective.

Outbound Video/Voice call routing



We are interested in voip/video collaboration!

what we still need to work on

- IPv6 reachability and dual-stack interoperability of endpoints
- bridging rtp to non IP devices via SBC
- automated monitoring and testing - we need periodic testing of device to device connectivity to ensure continued compatibility and quality.
- example of end-to-end testing data, over a day and week:

