



# H.350

(ITU-T Recommendation H.350 Directory Services Architecture for Multimedia)

## *What and Why?*

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**CSMM WG**  
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# What Is H.350 ?

- H.350 is
  - An LDAP schema
  - Standardized way to store information
  - Simple, basic elements are defined
  - Extensible – can include proprietary elements
  - Multi - protocol
- H.350 is not
  - A protocol
  - Just for H series protocols

# LDAP?

- Lightweight Directory Access Protocol
- A protocol describes messages used to access certain types of data
- LDAP provides a data model (schema) that standardizes data naming and organization for global unique naming
- Derived from OSI X.500
- LDAP V3 ([IETF RFC 3377](#)) includes important security enhancements (SSL...)

# Origins Of H.350

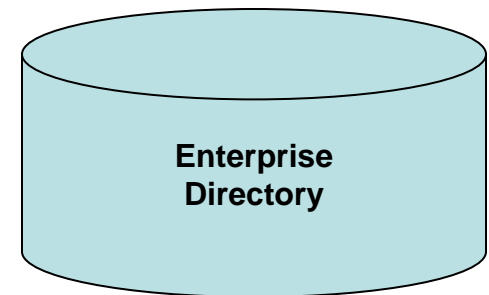
- ViDe and Internet2 exploring ‘video and voice over IP to every person on Earth.’
- ViDeNet testbed providing ‘video and voice Internet’ for several hundred universities and research networks worldwide (<https://videnet.unc.edu>)
- ViDeNet scalability issues
  - Interoperability
  - Call signaling
  - Security
  - Network Management
- Operational need for directory-enabled video/voice led to Video Middleware working group
- Architecture proposed to ITU-T, accepted and ratified as H.350 in August 2003

# What Operational Needs?

- Universities are building central, authoritative user directories – Use this identity management system, don't replicate into vendor's (often proprietary) directory
- Standardize storage of protocol-specific data to ease updates and migrations; one central data store for multiple protocols
- Leverage identity management for reliable USER (not device) authentication

# The Enterprise Directory

- Central stores of information about people associated with an institution
- Authoritative (eg: Human Resources, Registrar; Telecommunications)
- ONE consolidated list – duplicate identities resolved
- Benefits:
  - Correct and current
  - Single location to disable account
  - Single location to reset password
- Video/VoIP manager – reinvent this wheel?



# The Hardest and Most Expensive Part of Video / VoIP

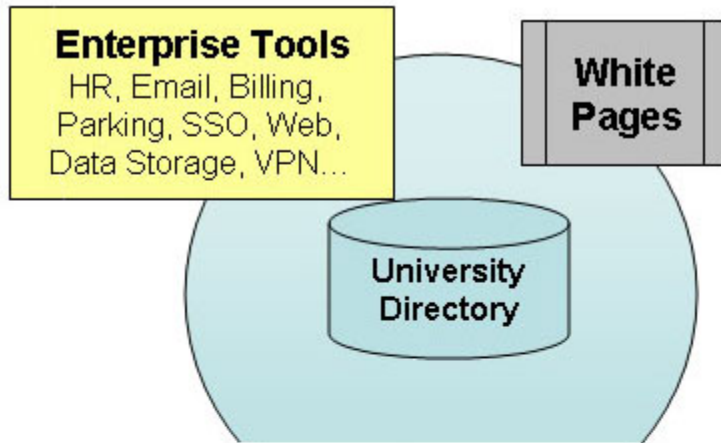
- Not the protocols – they work pretty well
- Not calls servers and endpoints – they work well and are reasonably priced.
- Managing Users and Workflow becomes the biggest issue once deployment scales up.
  - Requesting gatekeeper/proxy server entry
  - Requesting white pages listing for dialing info
  - How to do reliable billing
  - How to implement classes of service
  - Getting configuration information right in endpoints

# Problems Facing the Service Provider

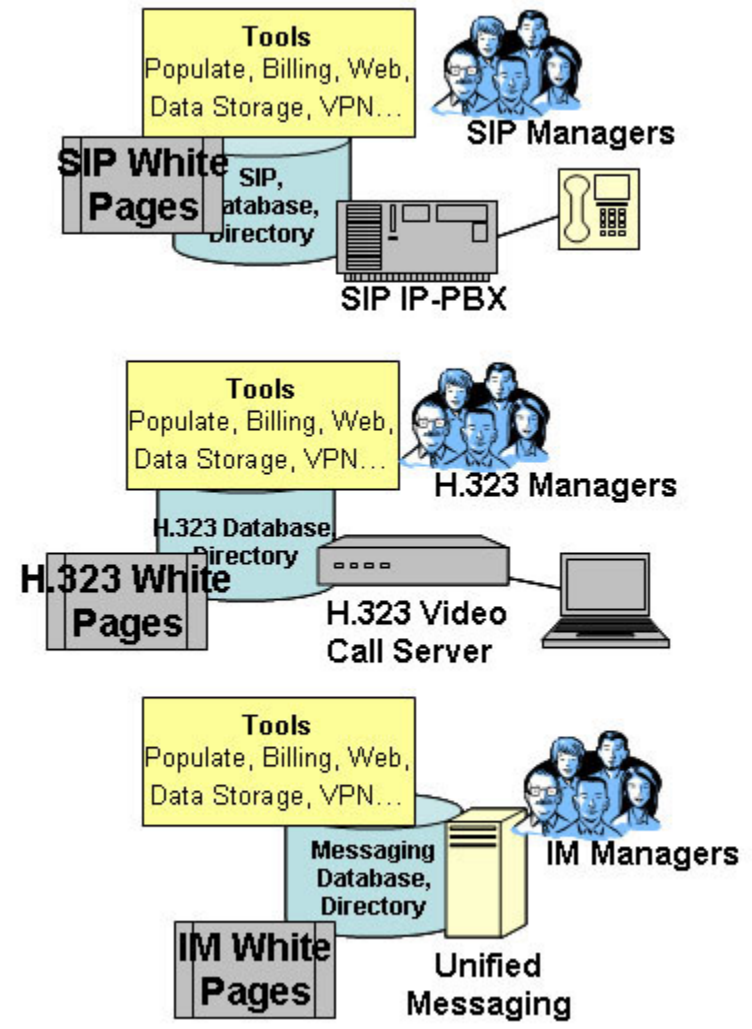
- How do I manage full scale video / VoIP?
- How do I manage workflow?
- How do I manage multiple protocols?
- How do I keep from getting locked into a single vendor?
- How do I chose components from several vendors?
- I manage voice and video. You mean I have to manage users, too ?



# Technology Silos → Redundant Processes and Confusion



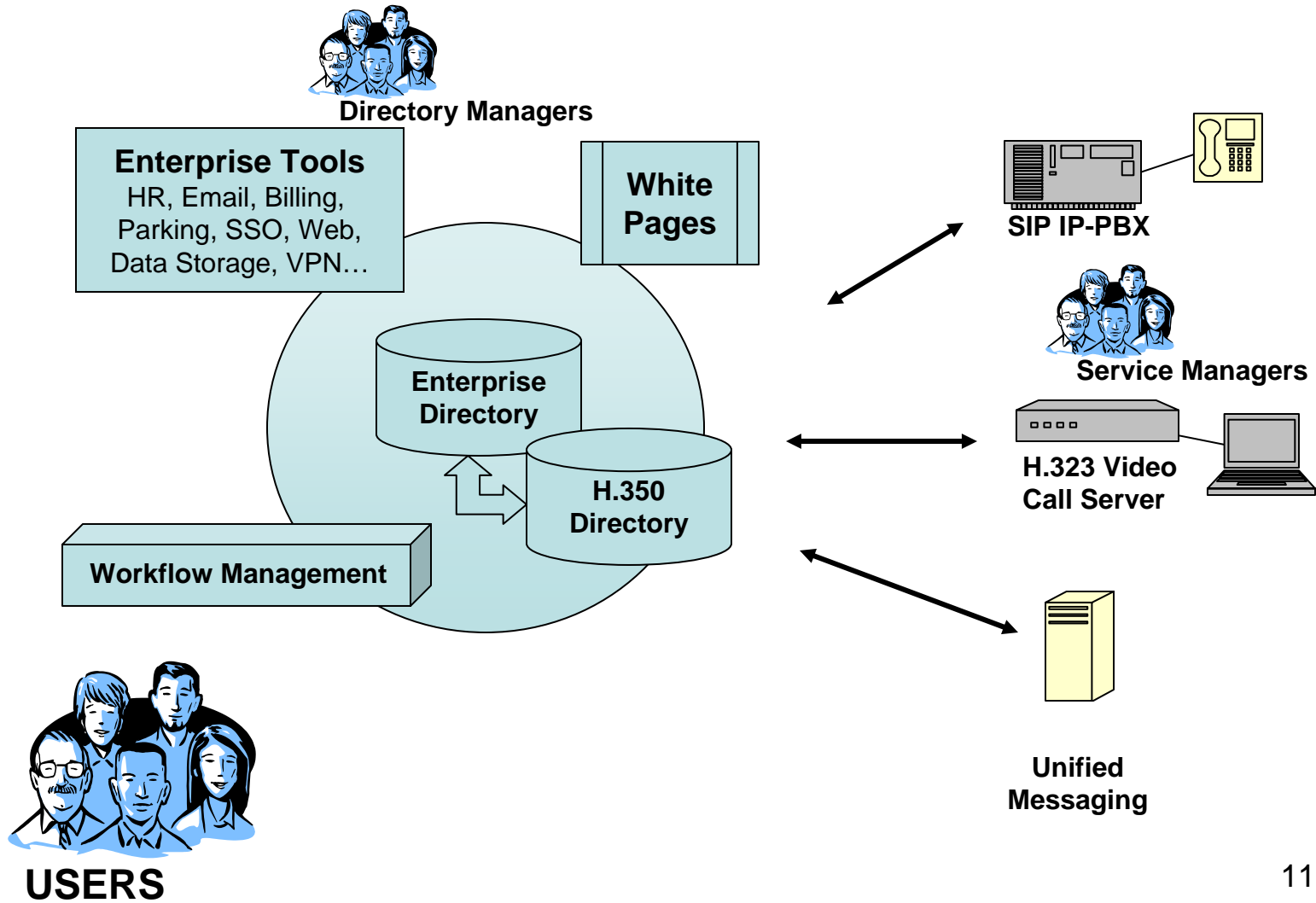
My listing is wrong!  
How do I call X?



# H.350 Design Goals

- Associate endpoints with people
- Enable online searchable "white pages"
- Store all data in central directory (not call server); draw from authoritative source & avoid duplication
- Support global white pages "portals"
- Multiple endpoints/user; multiple protocols/endpoint
- Provide or auto-load per-user configuration
- Extensible
- "Lightweight" impact on enterprise directory

# Directory-Enabled Video / VoIP → “Sanity”



# Benefits From Standardized Identity Management for Video / VoIP

- Without re-working business process, you can
  - Change vendor platforms
  - Have multi-vendor services
  - Integrate more than just video/voice (e.g. email, web)
- Leverage existing identity management tools
  - Most call server manufacturers not expert at identity management
  - LDAP tools are mature, secure, flexible, open

# H.350 Series Recommendations

- **H.350** - Directory services architecture for multimedia conferencing
  - Base architecture
- **H.350.1** - Directory services architecture for H.323
- **H.350.2** - Directory services architecture for H.235
- **H.350.3** - Directory services architecture for H.320
- **H.350.4** - Directory services architecture for SIP
- **H.350.5** - Directory services architecture for non-standard protocols
- **H.350.6** – Directory services architecture for call forwarding and preferences
- **H.350 Implementers Guide**

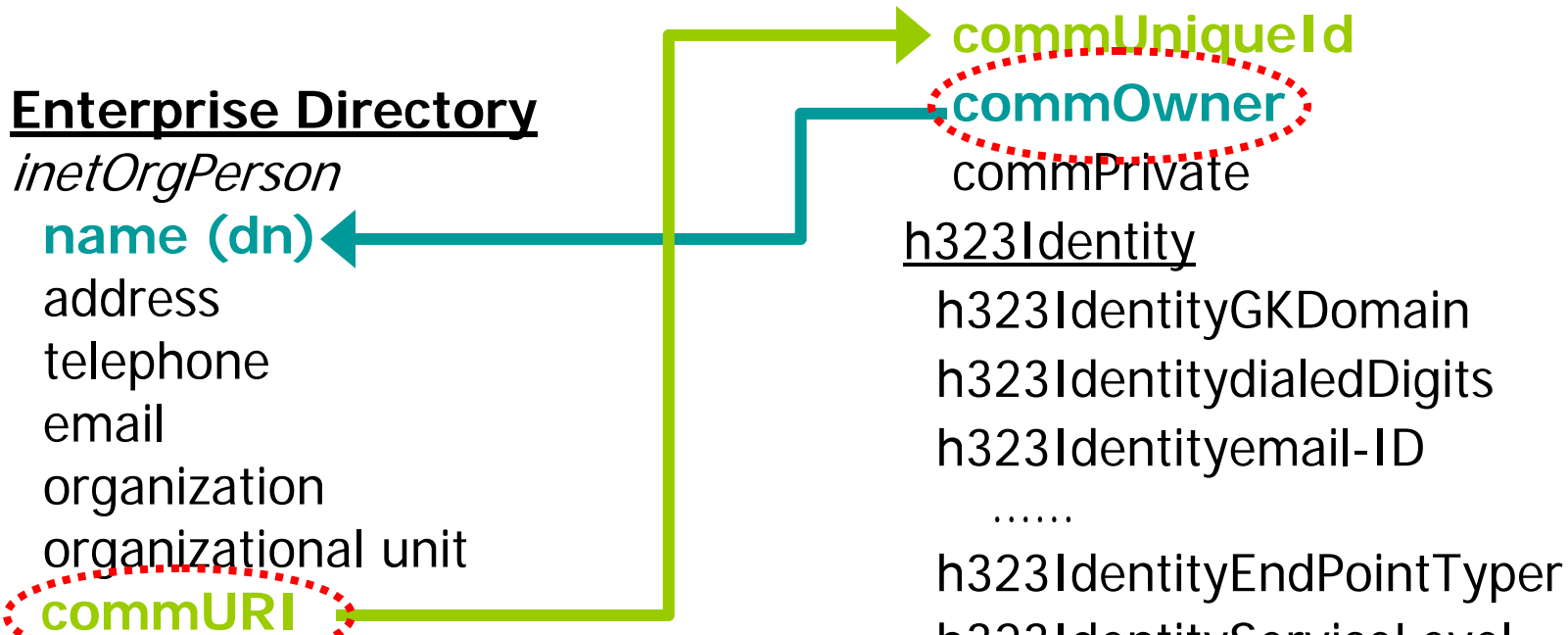
# A Peek Inside H.350

## Enterprise Directory

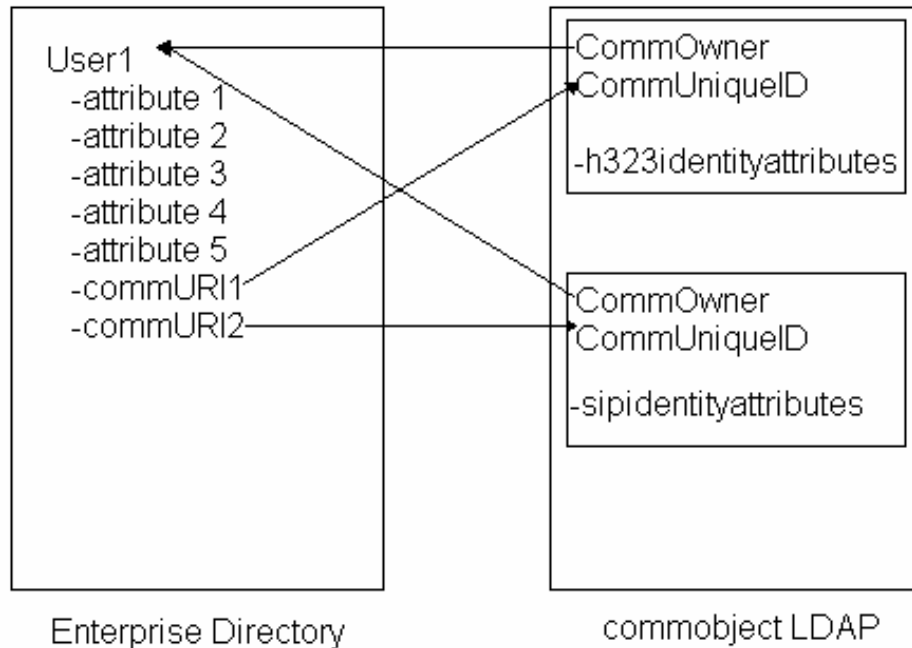
*inetOrgPerson*  
 name (dn)  
 address  
 telephone  
 email  
 organization  
 organizational unit  
**commURI**  
*RFC 1274*  
 userPassword

## H.350 Directory

*commobject*  
**commUniqueId**  
**commOwner**  
 commPrivate  
h323Identity  
 h323IdentityGKDomain  
 h323IdentitydialedDigits  
 h323Identityemail-ID  
 .....  
 h323IdentityEndPointTyper  
 h323IdentityServiceLevel  
h235Identity  
 h235IdentityUid  
 h323IdentityPassword  
 userCertificate



# Flexible Architecture

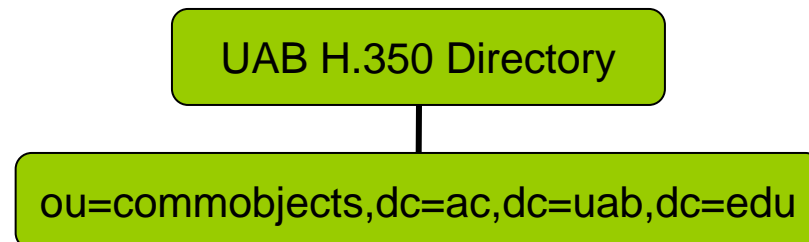
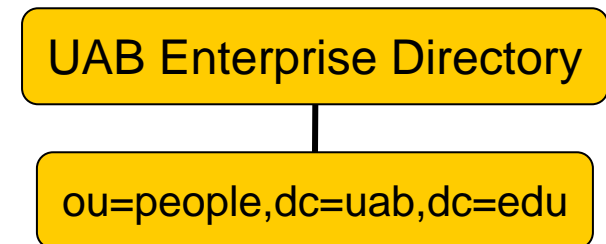
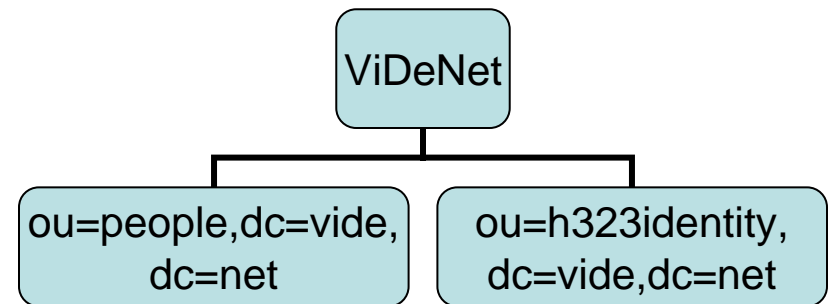


One person can be associated with more than one commURI (ie, device)

One person can be associated with multiple protocols, eg. both H.323 and SIP

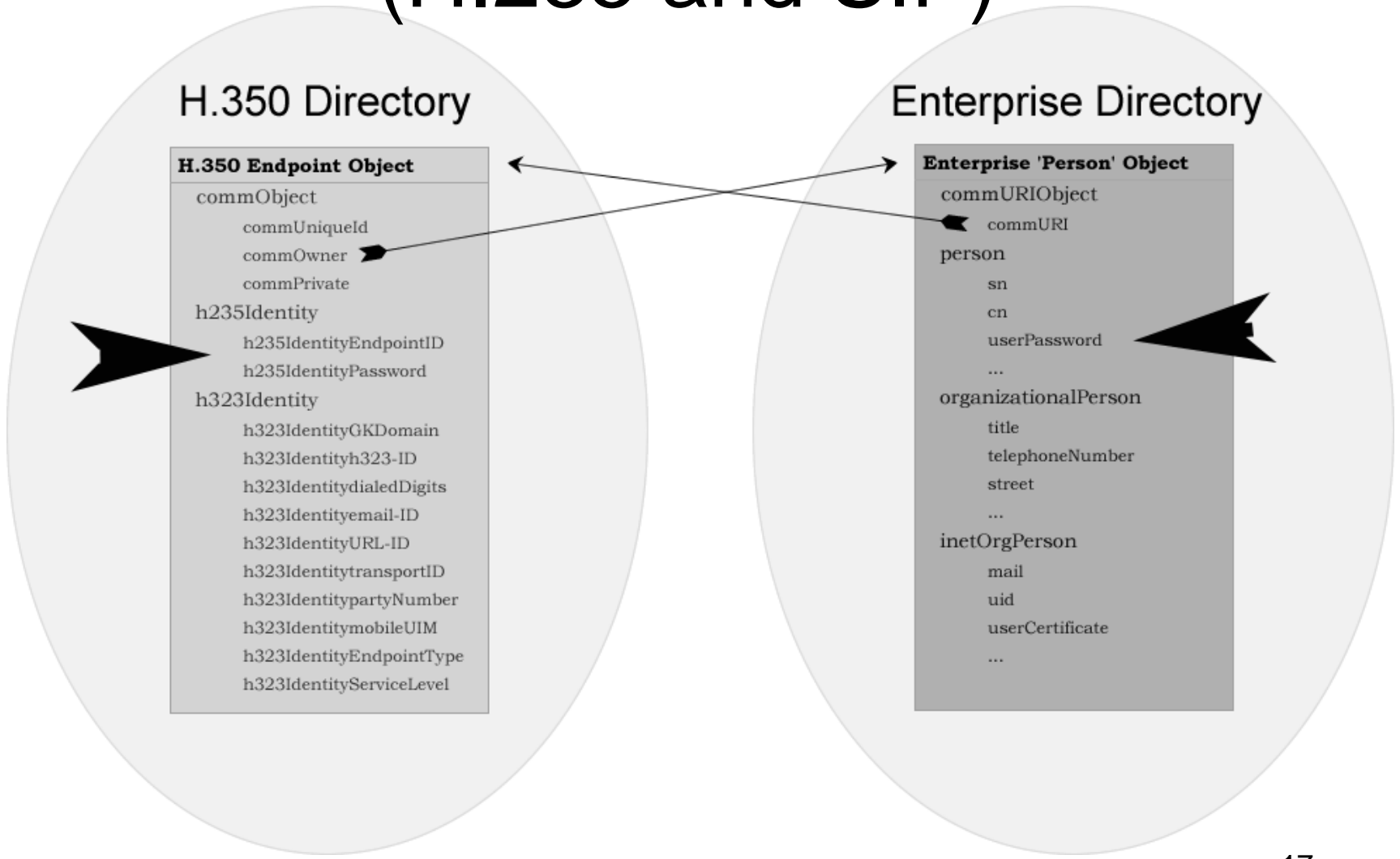
# Flexible Deployment

- Enterprise and H.350 directories can be two branches of a single DIT, or
- May be implemented as two separately administered directories
- Enterprise entry needs only commURI





# Security Credential Storage (H.235 and SIP)



# H.350.6 Call Forwarding and Preferences

- URI + Label
  - URI points to location where call forwarding address can be found
  - Label specifies type of forwarding and wait time
- Potential Targets
  - Another number
  - Unified messaging number
  - CPL script
  - mailto:
  - Web form 'Sorry we missed your call. Please fill out this form and we'll have someone call you back'
  - whack\_a\_mole.jsp video game

# Example Entry in ViDeNet Directory

Name:	Jill Gemmill
Organization:	University of Alabama at Birmingham (UAB)
Department:	Academic Computing
E-mail:	<a href="mailto:jgemmill@uab.edu">jgemmill@uab.edu</a>
Title:	Assistant Director
Phone:	205-975-2850
Street address:	701 20th Street South
City:	Birmingham
State/Province:	Alabama
Country:	us
Postal Code:	35294
Endpoint:	<a href="#">My Desktop</a> AB 7th Floor Room Unit

My Desktop	
H.323 DialedDigits Alias:	<a href="#">00120534890700</a>
H.323 Id Alias:	<a href="#">Jill's Desktop</a>
H.323 EmailId Alias:	<a href="mailto:jgemmill@UAB.EDU">jgemmill@UAB.EDU</a>
H.323 Transport Id Alias:	<a href="#">138.26.187.80</a>
Owner:	<a href="#">jgemmill</a>

<http://www.vide.net> "Enter ViDeNet"

# 'Non-Standard' Protocols

- H.350.5 GenericIdentity
- For: VRVS, Access Grid, MPEG-2, etc

genericIdentity ProtocolIdentifier:	<b>VRVS</b>
generic Identity Message:	see <a href="http://www.vrvs.org/">http://www.vrvs.org/</a> for instructions

- <http://<Your instructions here>>

# Other Queries Are Possible

**ViDeNet**

My ViDeNet Help Zone Administrators Only

**ViDeNet Search Engine**

Word or Phrase for Search: UAB

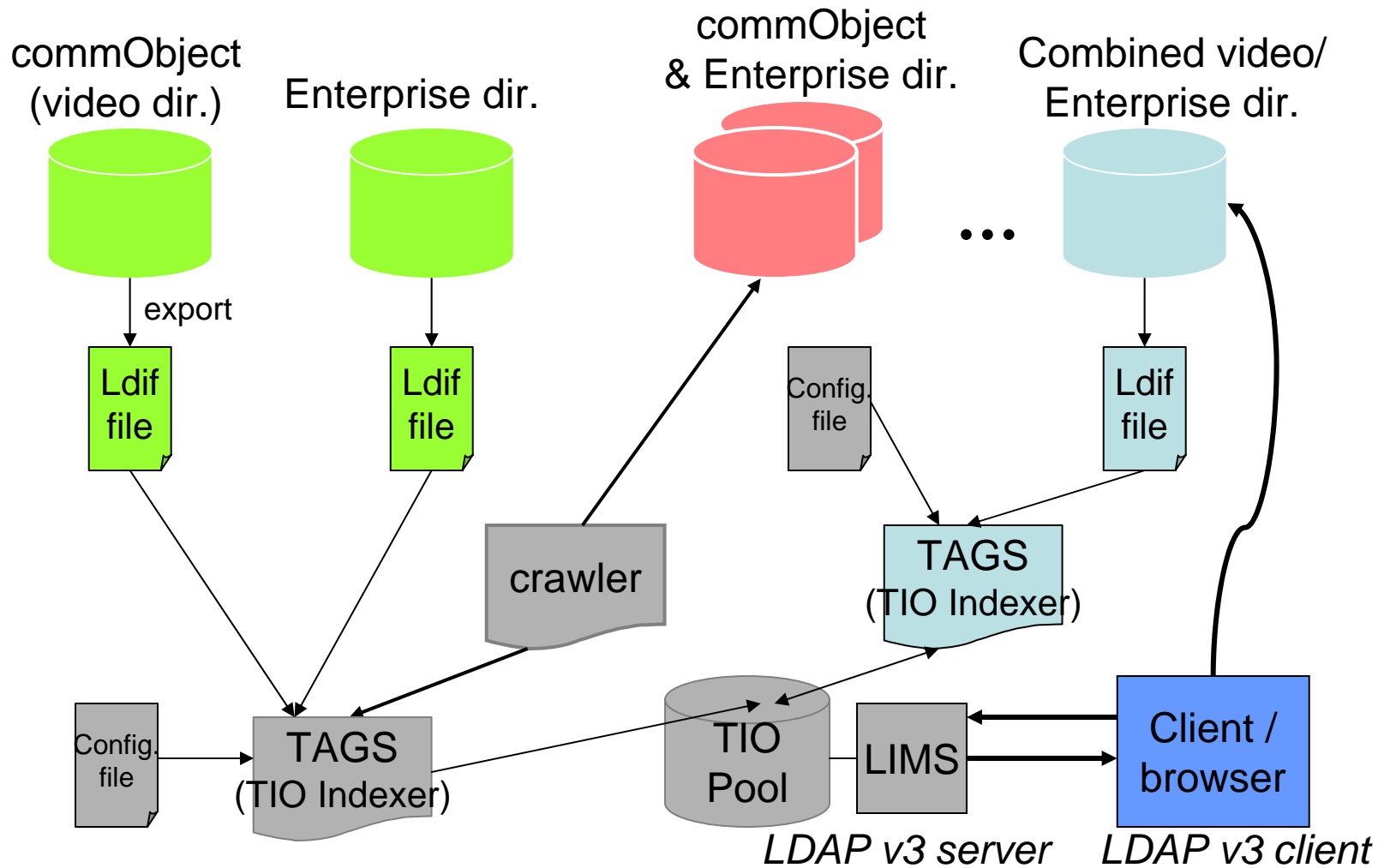
Select Field to Search: Institution

From the Following Location: All Countries

Search!

<http://directory.vide.net/>

# Global Directory Services



# About the Global Directory

- Where is it?
  - <http://directory.vide.net/>
- How do you arrange for your servers to be indexed by it?
  - Contact Egon Verharen [Egon.Verharen@surfnet.nl](mailto:Egon.Verharen@surfnet.nl)
- More technical info
  - TIO = "Tagged Index Object ", RFC 2654
  - CIP = "Common Indexing Protocol", RFC 2653
  - LIMS = "LDAP Index Metadata Server" (Catalogix)

# Public Directories

- People use video conferencing to reach others far away
- Remote institutions may not be able to provide directory services
- ‘Public’ directory may provide a useful resource
- Very different security policies
  - Timeouts
  - Few access rights
  - Less tech support
  - Firewall-land



So, does any of this stuff work and exist in the real world?

# Prototypes Developed

- ViDeNet and “early adopter” directory entries
- H.350-aware H.323 endpoint
- H.350-aware gatekeeper
- H.350-aware SIP user agent
- H.350-aware SIP Proxy server
- Automated configuration for endpoints
- Enterprise authentication used to obtain protocol-specific password
- White pages and “Directory of directories”

## Endpoints Implementing H.350 can...

- Lookup correct configuration information and load it. Solves big user support issue!
- No matter what protocol or brand, necessary data can be managed in an organized way.
- Do white pages search via LDAP protocol – receive answers; ‘click to dial’ if supported.

## Endpoints Implementing H.235 can...

- Lookup correct configuration information and load it. Solves big user support issue!
- No matter what protocol or brand, necessary data can be managed in an organized way.
- Do white pages search via LDAP protocol – receive answers; ‘click to dial’ if supported.


# Call Servers Implementing H.350 can...

- Pull information from canonical store
  - Solves manual data entry problems
  - Can convert canonical to proprietary if needed on the fly
- Use `XIdentityServiceLevel` attribute to provide levels of authorization
- Scale up video/voip operations

# UAB Electronic Phonebook

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[New Search](#) [Need Assistance?](#) [DC/NS Home](#) [UAB Home](#) [Authenticate](#) [Change Information](#)



[Main Menu](#) [Need Assistance?](#) [DC/NS Home](#) [UAB Home](#) [BlazerID Central](#)



*Jill B Gemmill*

BlazerID/Phonebook alias: **JGemmill**  
 Internet Email address: [JGemmill@uab.edu](mailto:JGemmill@uab.edu)  
 University department: **Academic Computing**  
 University job title: **Asst Dir Academic Computing**  
 Physical location of office: [Administration Building](#)  
   **AB 719**  
 Paper mail address of office: **1530 3RD AVE S**  
   **BIRMINGHAM AL 35294-0107**  
 Office telephone number: **(205) 975-2850**  
   Office hours: **9-6**  
   Current project(s): **Internet2, Secure Internet videoconferencing, ViDe**  
 Other colleges attended: **Antioch College**  
 URL for WWW use: <http://www.dpo.uab.edu/~jgemmill/>  
 Fraternity or sorority: **never have liked them much**  
 Degrees earned: **B.A. • M.S. • MSEE**

## [H323] My Desktop

Attribute	Value
commOwner	<a href="#">jgemmill</a>
h323IdentitydialedDigits	<b>00115490000</b>
h323IdentityEndpointType	Terminal

- Multimedia contact info:
- [\[H323\] My Desktop](#)
  - [\[H323\] AB 7th Floor Room Unit](#)

# Industry Uptake? Yes!

- RADVISION ECS
- VCON MXM (Q2 2004)
- Tandberg TMS 8.0
- HCL SIP Proxy

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**Videoconferencing vendors embrace H.350**

By **Jason Meserve**  
 Network World, 03/22/04

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In an effort to ease management of large IP video or even voice deployments, videoconferencing vendors are rallying around a new specification that standardizes the way endpoint addressing information is stored.

**H.350**, the IEEE specification ratified in September for storing IP video and audio contact information in a central directory, is appearing in commercial products, most recently Radvision's **Enhanced Communications Server 3.5** gatekeeper release, a server that authorizes endpoints on a network and provides dialing plans such as mapping a standard four-digit extension to a device's IP address.

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Unlike many "h-dot" standards, H.350 is not a protocol, but a Lightweight Directory Access Protocol (LDAP) schema that standardizes the way endpoint information such as IP address, H.323 ID aliases and associated gatekeeper domain

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**Exhibit 5**  
**Polycom Accelerated Communications (PAC)**  
 Source: Polycom, Inc., 2004

Polycom Accelerated Communication (PAC)						
Security and Encryption Services	Network/Device Management	Directory Services	Quality of Service	Protocol Optimization	Media Optimization	Application Programmer Interface (API)
H.235 AES SSL	PCS MGC GMS Gatekeeper SNMP	GAB LDAP H.350(future)	<b>iPriority™</b> Quality of Experience Engine Network-based QoS ToS/CoS/RSVP Application-based QoS Video error concealment Audio error concealment Media and Communication Protocol transcoding			

# What About Presence?

- Call forwarding and Call preference *is not* presence
- sip.edu (an Internet2 project) uses presence and didn't think much of H.350.....until they scaled up their service and decided configuration storage and autoconfiguration were “good things”.

# ViDe H.350 Cookbook

- 60+ pages of text and 200 pages with step by step instructions and examples
  - Detailed description and example use of each attribute in all H.350 objects
  - LDIF files ready to use for iPlanet, OpenLDAP, and Active Directory
  - H.350 installation and server configuration instructions
- Included in [National Science Foundation Middleware Initiative \(NMI\) Releases 4 & 5](#)



# ViDe H.350 Cookbook

<http://lab.ac.uab.edu/vnet/>



quick links	May 27, 2004
<p><b>ViDe Cookbook for Videoconferencing Middleware:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">HTML</a></li> <li>• <a href="#">Version 0.5 pdf</a></li> <li>• <a href="#">Version 0.64 pdf</a></li> <li>• <a href="#">Version 0.73 pdf</a></li> <li>• <a href="#">Version 1.0 pdf</a></li> </ul> <p><b>ViDe H.350 Brochures</b></p> <ul style="list-style-type: none"> <li>• <a href="#">university</a></li> <li>• <a href="#">vendor</a></li> </ul> <p><b>ViDe H.350 LDIF Files</b></p> <p><b>ViDe CGUsip Client v1.1</b></p> <p><b>ViDe Search</b> the ViDeNet proof of concept H.350 directory</p> <p><b>ViDe Register</b> in the ViDeNet proof of concept H.350 directory</p> <p><b>ViDe Search</b> the ViDeNet global video directory of directories prototype</p>	<p><a href="#">Version 1.0</a> of the ViDe H.350 Cookbook has been released!</p> <hr/> <p><b>April 08, 2004</b></p> <p>Presentations for the 6th Annual SURA/ViDe Workshop and the H.350 Workshop are now available on the <a href="#">presentations</a> page.</p> <hr/> <p><b>December 15, 2003</b></p> <p>The <a href="#">Video Middleware Cookbook 0.5</a> has been released for <a href="#">National Science Foundation Middleware Initiative (NMI)</a>.</p> <hr/> <p><b>March 19, 2003</b></p> <p>Press releases are now featured on the <a href="#">links</a> page.</p> <hr/> <p><b>March 19, 2003</b></p> <p>The <a href="#">CGUsip Client v1.1</a> is now available.</p>

Questions and Comments: [Jason L. W. Lynn](#)  
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# Acknowledgments

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**RADVISION, Cisco**

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