

Recording in Asterisk

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Audio Recording Options in Asterisk

- Recording to hard drive (default)
- Recording to RAM drive
- Pass-thru or 'packet sniffer' recording



How Recording Works in Asterisk

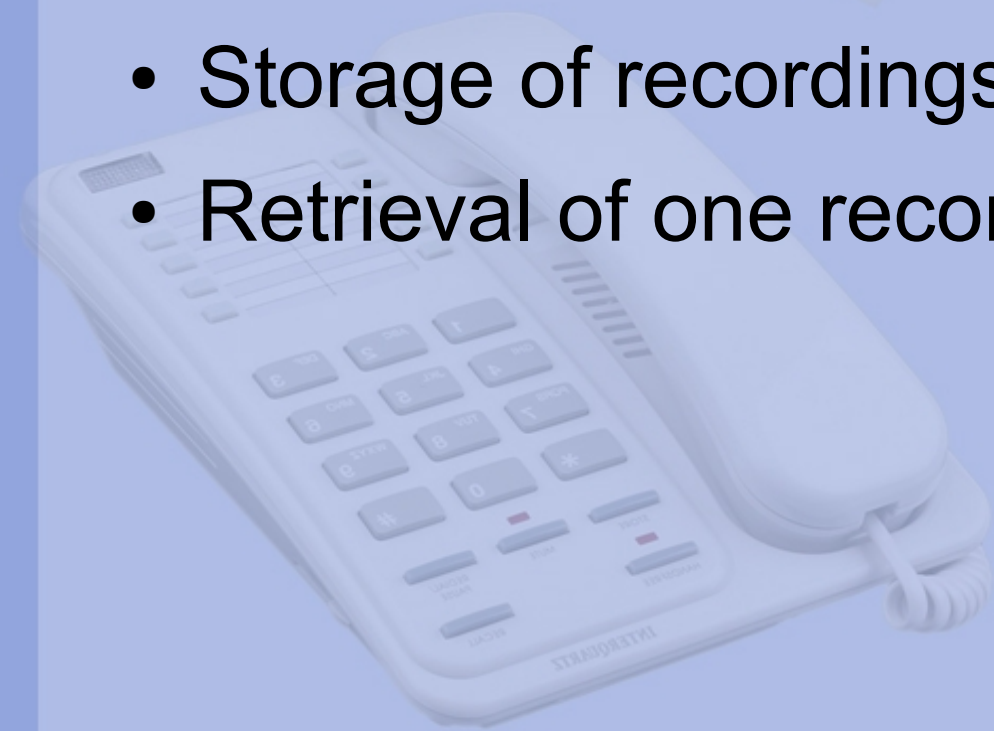
- The monitor() command and application
- Default location of recording files:
`/var/spool/asterisk/monitor`
- Calls can be recorded in almost any format that your Asterisk installation can support:
(gsm, wav, ulaw, pcm, vox, etc...)
- Separate -in and -out streams written as different files, requires mixing together
- Recording files written in 44 byte chunks

The monitor() Application

- Dialplan application
 - exten => `_.*,1,Monitor(wav|${CALLERID(name)})`
 - 'm' flag will automatically mix the two files
- AMI(Asterisk Manager Interface) API command
 - Action: Monitor
 - Channel: IAX2/cc350-10811
 - File: 20080920-102706_6666
- Files created:
 - 20080920-102706_6666-out.wav
 - 20080920-102706_6666-in.wav

Recording Issues in Asterisk

- Recordings on standard calls must be mixed after the call is over to have both sides of conversation in same recording file
- No file-write buffer for recording
- Storage of recordings
- Retrieval of one recording out of millions



Separate in/out Recording Files

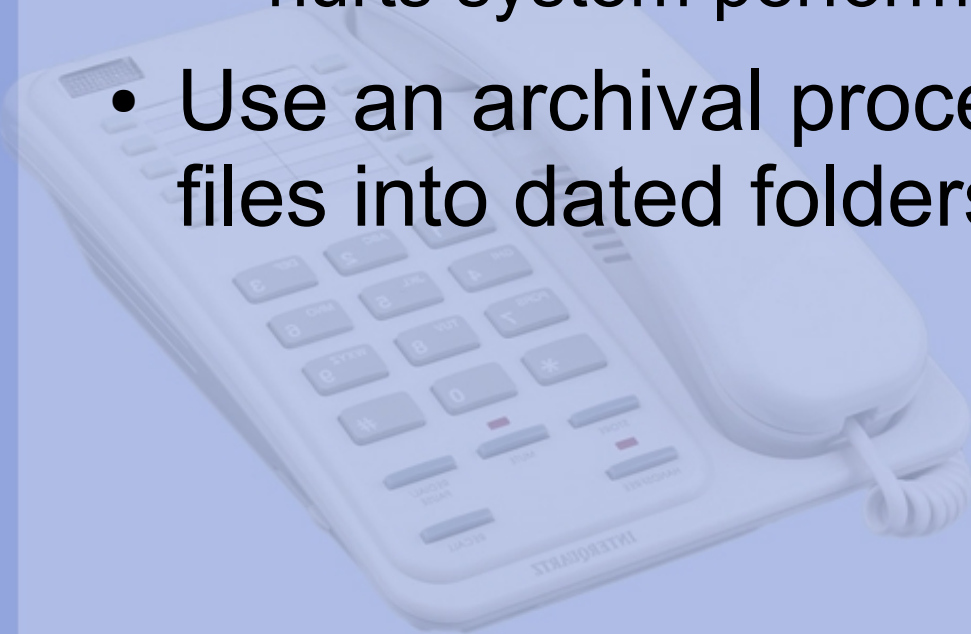
- In most cases, recordings must be mixed together to hear the whole conversation
- Requires either automatic mixing, using the 'm' flag in monitor() or a separate process to mix
 - Automatic mixing with 'm' flag may lead to load spikes or drive IO issues.
 - Separate process allows for interesting options like:
 - Mixing to stereo where each direction is on different channel (left and right)
 - Adjusting of the audio levels
 - Removing long periods of silence
 - Speeding up the conversation for faster review

No-write-buffer Recording Issue

- This creates fragmentation, hard drive stress and machine load issues
- Recording to hard drive limit of 50-70 concurrent recordings
- Files written concurrently are extremely fragmented
- Recording to standard IDE or SATA drives more than just occasionally will result in drive failure
- There is a patch against 1.6 and trunk to add 32k buffer (bug 11962)

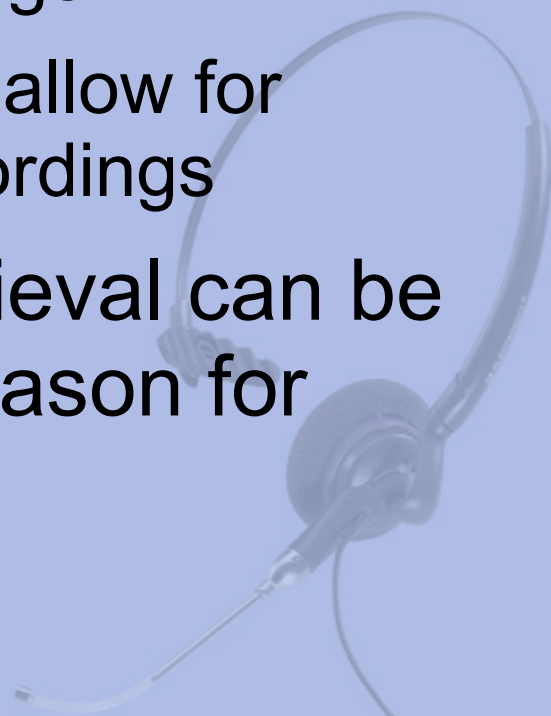
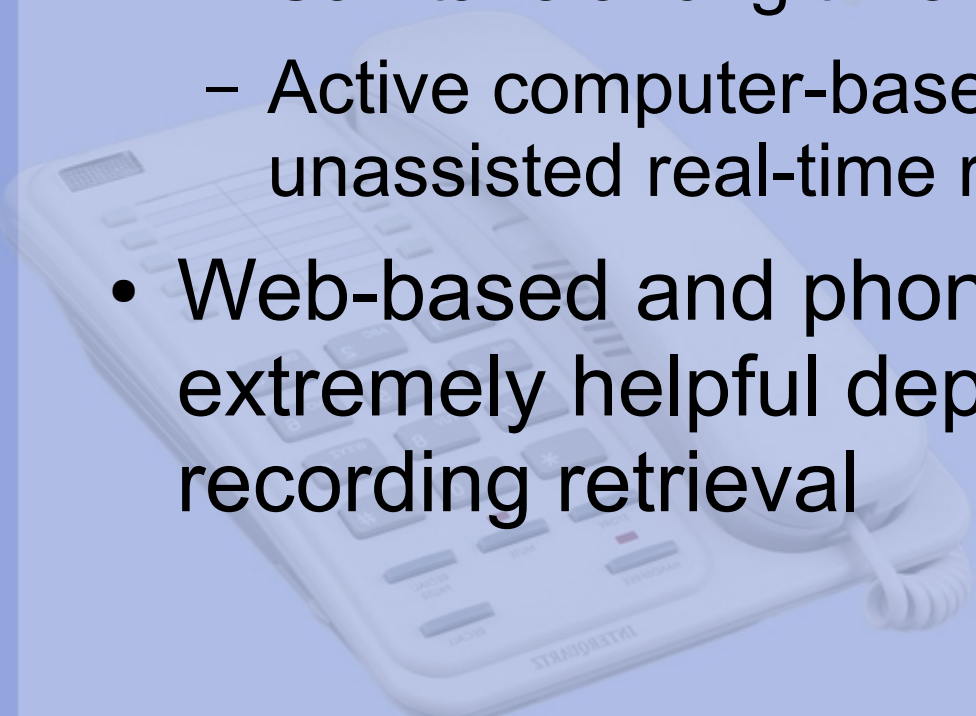
Storage of Recordings

- Compress the recordings
 - Ulaw/Alaw/slin are 10 x the size of MP3 or GSM
- Store on a machine other than Asterisk server
 - Disk IO from retrieving recordings while writing hurts system performance
- Use an archival process that will put recorded files into dated folders



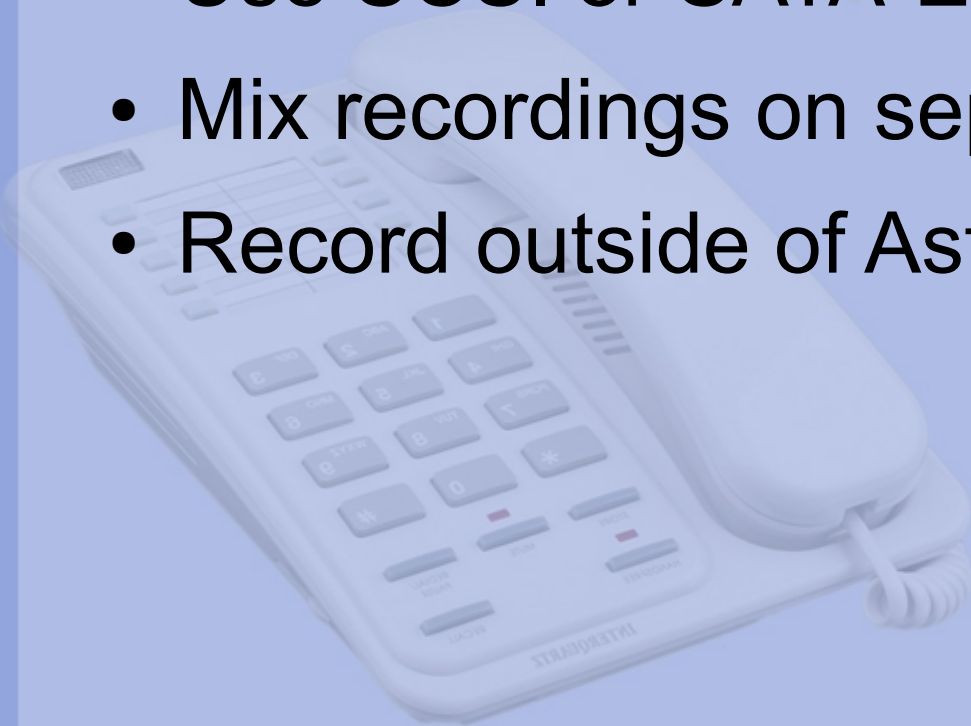
Retrieval of Recordings

- Database-based recordings list is ideal for high-volume recording archive systems
- Do not rely entirely on static media
 - Can take a long time to find recordings
 - Active computer-based storage can allow for unassisted real-time retrieval of recordings
- Web-based and phone-based retrieval can be extremely helpful depending on reason for recording retrieval



Fixes for System Limitations

- Recording to RAM drive
 - 250+ concurrent recordings
 - No fragmentation issue
- Use SCSI or SATA-ES drives
- Mix recordings on separate machine
- Record outside of Asterisk



RAM Drive options

- Linux RAM drive
 - Fixed size, reserved RAM, cannot overflow
- tmpfs
 - Uses available RAM and can overflow into swap
- RAMback – new kernel patch
 - RAM drive with immediate backup to magnetic media
- iRAM by Gigabyte and other separate RAM-based devices
 - SATA connected device with standard RAM DIMMS
 - Battery backup on-board for non-volatile storage

Recording Outside of Asterisk

- TDM-based(T1/E1/POTS) passthru recording
- Network Sniffer - SIP/IAX passive network packet sniffing recording



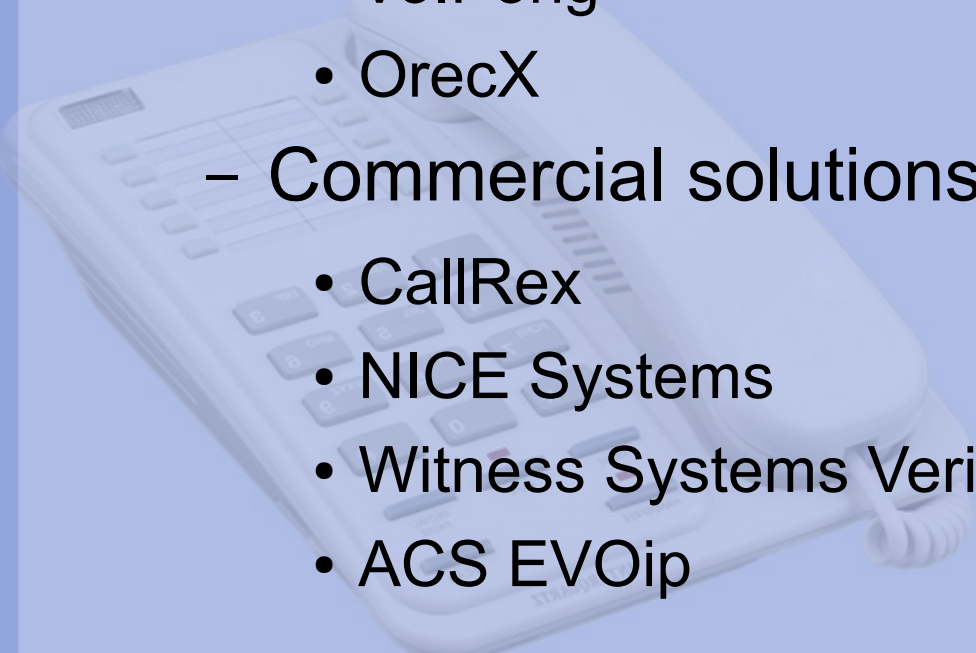
TDM-based Passthru Recording

- Dozens of T1-based and analog port passthru solutions exist, anywhere from \$200-\$2000/port
 - Expensive, but entirely separated from Asterisk
 - Usually only dialed phone number and date can be used as identifiers of a recording
- Sangoma RTP-tap feature
 - Allows for sending of T1/E1 data as a RTP ulaw audio stream to network-sniffer type recording systems



Network Sniffer Recording

- Solutions analyze and collect network traffic either through broadcast port on network switch, or at the Asterisk server level
 - Open-source options
 - VolPong
 - OrecX
 - Commercial solutions
 - CallRex
 - NICE Systems
 - Witness Systems Verint
 - ACS EVOip



VoIPong

- Open-source software package (GPL license)
- Records SIP conversations to WAV files
- Terminal-based management only



Orecx / Oreka

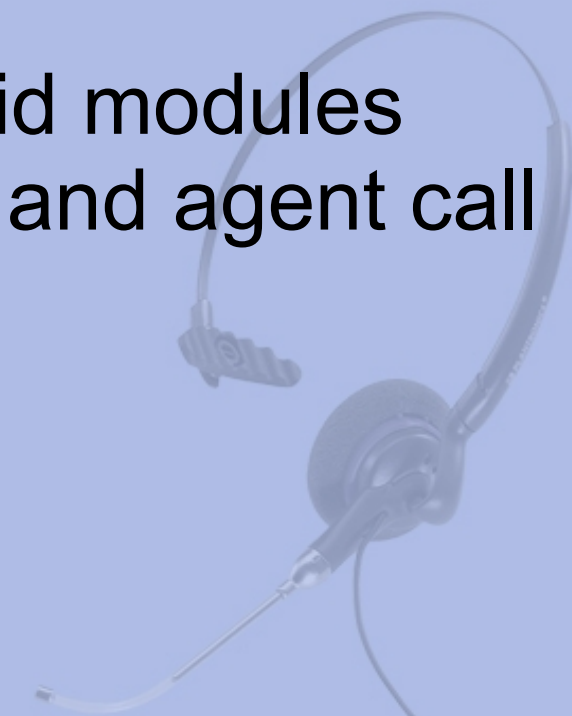
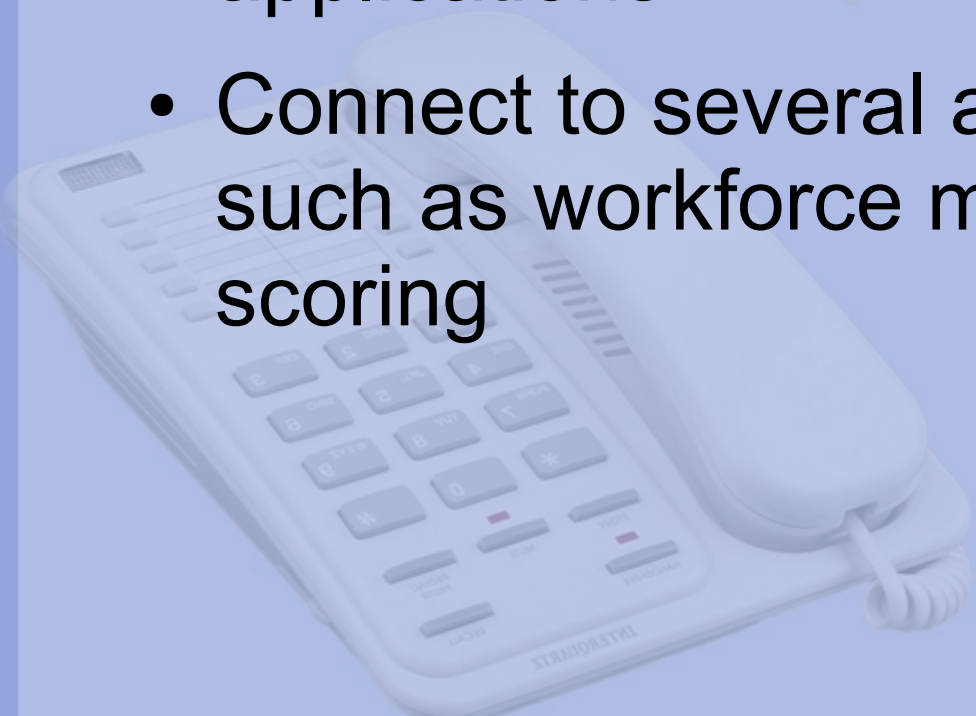
The screenshot shows a web browser window titled "OrcWeb - Browse Recordings - Microsoft Internet Explorer". The address bar shows "http://localhost:8080/orcweb/app?page=RecSegments&service=page". The interface includes a navigation menu with buttons for "Welcome", "Browse", "Tags", "Programs", "Users", "Groups", "Live", "Setup", "Account", and "Logout". On the left, there is a "Filter by" section with a dropdown menu and several input fields for "Tag name", "Recording ID", "Min Duration", "Max Duration", "Local Party", "Remote Party", and "IP Addresses". There are also "Start Date" and "End Date" fields with calendar icons, and radio buttons for "Outgoing", "Incoming", and "Both". A "Search" button and a "Calculate disk space" button are at the bottom of the filter section. The main content area displays a table of recording segments with columns for "TIME", "DURATION", "LOCAL PARTY", "DIRECTION", and "REMOTE PARTY". The table shows 10 rows of data, with the 5th row highlighted in yellow. Below the table are "Export query results" and "Export selected" buttons. The page number "Page 1/50 500 Results" is shown at the top and bottom of the table area.

TIME	DURATION	LOCAL PARTY	DIRECTION	REMOTE PARTY
2006-11-03 15:36:05.0	18	a1725036527	→	1173117467
2006-11-03 15:36:04.0	6	1173117467	→	1618295767
2006-11-03 15:36:03.0	35	1618295767	→	84993438
2006-11-03 15:36:02.0	24	84993438	→	a1397984251
2006-11-03 15:36:01.0	12	a1397984251	→	1045526260
2006-11-03 15:36:00.0	44	1045526260	→	1183054624
2006-11-03 15:35:59.0	2	1183054624	→	a426214134
2006-11-03 15:35:58.0	22	a426214134	→	913088073
2006-11-03 15:35:57.0	58	913088073	→	a1660465461
2006-11-03 15:35:56.0	37	a1660465461	→	694979872

- Open-source core package (GPL license)
- Linux based core
- Paid add-on packages for advanced features
 - Live monitoring
 - Recording Management and retrieval
 - Agent screen-capture

Commercial Options

- Paid-for Closed-Source applications
- Most run only on Windows Servers
- Most offer an API for integrating with existing applications
- Connect to several additional paid modules such as workforce management and agent call scoring



Thank you!

For more information, go to:

www.eflo.net

