



# Keep your words

**Verba Trader Voice Recording**

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# Verba Technologies

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Working in call recording – compliance space since 2001

## Verba offices

Americas

Atlanta, USA

UK

London, UK

APAC

Singapore

R&D/Support

Budapest, Hungary

## Verba representatives

USA/Canada

Chicago, Atlanta, Minneapolis

Northern Europe

Stockholm

APAC

Singapore and Hong Kong

Australia/NZ

Sydney

Middle East

Dubai

Africa

Nigeria



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# Select collaboration compliance customers

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# Financial Services





## Technology Partners / Integrations

## Unified Communications



### Trading Floor\*



## Mobile



## Analogue / Radio



RECORD / CAPTURE / ENFORCE

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## Recording

- Instant Messaging
- Voice
- Video
- Content Share
- Desktop Screen

## Enforce

- Communication Policies
- Ethical Wall
- Content Filtering
- Disclaimers

## Security

- Encryption
- Digital Signing
- AD Sync
- RBAC
- Audit Logs

## Data Retention

- Storage Targets
- Retention Policies
- WORM Storage
- Legal Hold
- Export
- Compliance Archives

# EXPORT

# STORE

# INTEGRATE

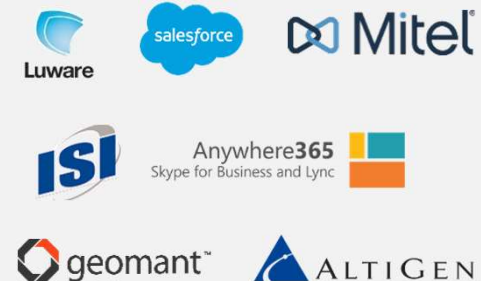
## Compliance Archives



## Storage



## Integrations



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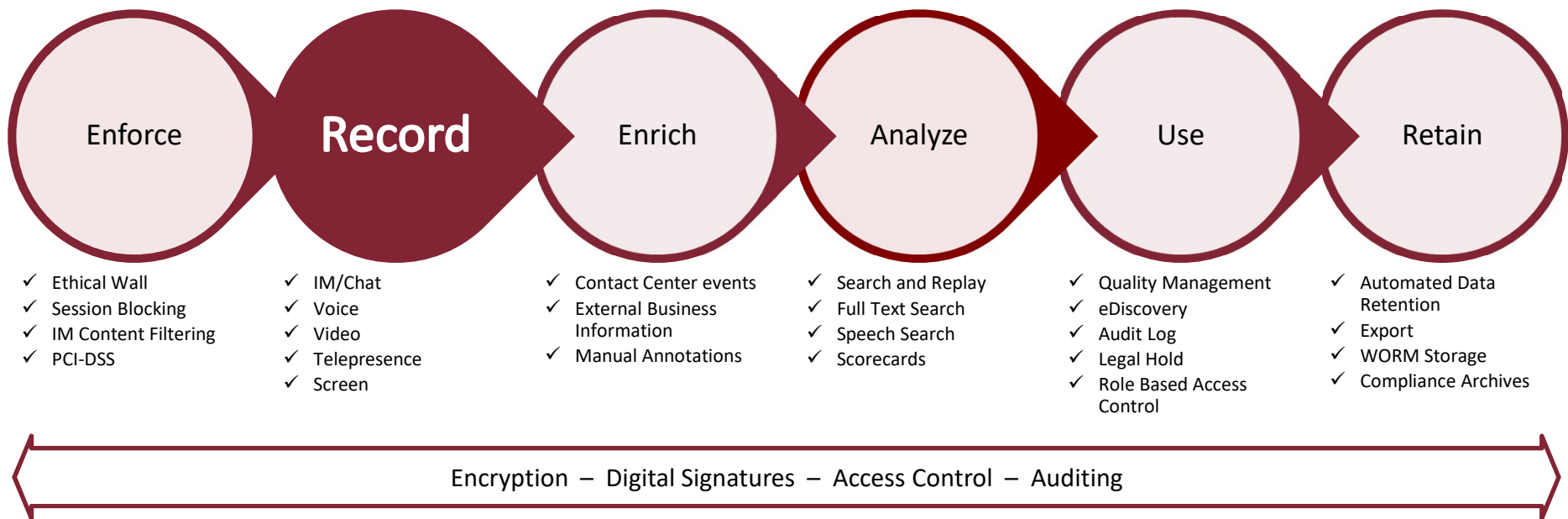
Verba Collaboration Compliance

# Technology

# Collaboration and Trader Voice Compliance

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## Verba Collaboration Compliance Framework



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# FinServ Specific Features



- Regulatory / Compliance recording
- Always-on recording
- Role based access control (System Administrator, Compliance, eDiscovery, Business Manager, etc.)
- Full audit trail
- Data retention policies, storage management (delete, archive, export, move, multiple storage targets)
- WORM storage integrations (NetApp, EMC, IBM, Hitachi, ...)
- Compliance archive integrations (O365, Bloomberg, HP, Smarsh, ...)
- Legal hold, eDiscovery, compliance workflows
- Recording reconciliation with Cisco and SfB CDR info
- Voice quality check
- File verification on storage
- Scalable and highly available platform



# Architecture

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## Media Repository

- Search & Replay
- Access Control & Auditing
- Central Administration and Configuration, AD Synchronization
- Data Retention Policies, Storage Management, Export
- Speech Indexing
- Compliance Workflows, Case Management, Legal Hold
- Quality Management
- Archived Content Import, CDR Reconciliation
- Reporting, Dashboard
- License Enforcement
- System Monitoring, Alerting
- APIs

## Recording Server

- Recording & Monitoring Services
- CTI
- Announcement
- Encryption and Signing
- Voice Quality Check
- Storage Management
- Communication Policies
- System Monitoring, Alerting
- APIs

## Database

- Central Configuration
- Conversation Meta Information
- One database per Verba instance
- Microsoft SQL Server Express, Standard, and Enterprise Editions
- SQL Server 2008 R2, 2012, 2014 and 2016
- Database Encryption, Secure Connection
- Mirroring, Clustering, Always-On

## Storage

- Network Storage (SMB, DFS)
- NetApp SnapLock
- EMC Isilon SmartLock
- EMC Centera
- Hitachi Content Platform
- Azure Storage
- Amazon S3
- IBM Tivoli Storage Manager
- Bloomberg Vault
- Smarsh
- SMTP
- Office 365 - Exchange Web Services API
- SFTP

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# Server Roles

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## Recording Server

- Recording Director
- Media Recorder

## Media Collector and Proxy Server

## Announcement Server

## Speech Analytics Server

## SfB/Lync Filter

## Desktop Recorder

## Media Repository

## Database

## Storage

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# Verba system components



1. **Verba Recording Server - Recording Director:** The recording interface that establishes the connection between Verba and the IPTrade turrets
2. **Verba Recording Server - Media Recorder:** processes and records calls
3. **Verba Media Repository:** provides central administration and configuration, web based UI, and central storage management
4. **Media Storage:** existing storage infrastructure to store recorded media files
5. **Microsoft SQL Database:** existing SQL Server infrastructure to host Verba databases storing configuration and CDRs
6. **Client:** web browsers accessing the user interface

# 1. Verba Recording Server - Recording Director



- IPTrade turrets connect to Recording Director when an agent logs on the turret
- When a call is placed/established the recording director selects a media recorder and allocates media recording session for the call
- The turret streams the media of the call to this media recorder

## 2. Verba Recording Server - Media Recorder

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- Decrypting, decoding, mixing and compressing audio on-the-fly
- Caching recorded conversations and uploading recordings to the final storage location configured in the data retention policies when it has a live connection
- Providing silent monitoring capabilities for recorded voice calls
- Receiving media streams and meta information
- Supported voice codecs:
  - G.711 A-law
  - G.711  $\mu$ -law
  - G.729
  - G.729A
  - G.729B
  - G.729AB
  - iLBC
  - G.722.1
  - Siren7
  - Siren14
  - Cisco Wideband
  - Opus

### 3. Verba Media Repository

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- Centralized interface to access recorded conversations
- Centralized management for the Verba servers
- Active Directory synchronization
- Single Sign On support
- Manages the archive, export functions
- For high availability, multiple Media Repositories can be deployed in parallel



## 4. Verba 9.0 Data Management

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### DATA MANAGEMENT POLICIES & FEATURES



#### Data Retention

Storage Targets

- Upload
- Move
- Delete
- Archive
- Increase Retention
- Export
- Legal Hold



#### Data Processing

Data Processors

- Transcription NEW
- Speech Indexing
- Voice Quality Check
- File Verification
- Encrypt & Sign
- Transcode



#### Data Import

Import Sources

- Cloud9 NEW
- Lync/SfB CDR
- Cisco IPT CDR
- Lync/SfB Archive
- Symphony NEW
- CyberTwice NEW
- RingCentral NEW
- Verba

Media Repository  
Local Disk

Network Storage  
(SMB, DFS)

NetApp SnapLock

EMC Isilon  
SmartLock

EMC Centera

EMC ECS NEW

Hitachi Content  
Platform

Azure Storage

Amazon S3 and  
Compatible

IBM Tivoli Storage  
Manager

Bloomberg Vault

Smarsh

External Verba  
Media Repository

SMTP

O365 Compliance  
Archive

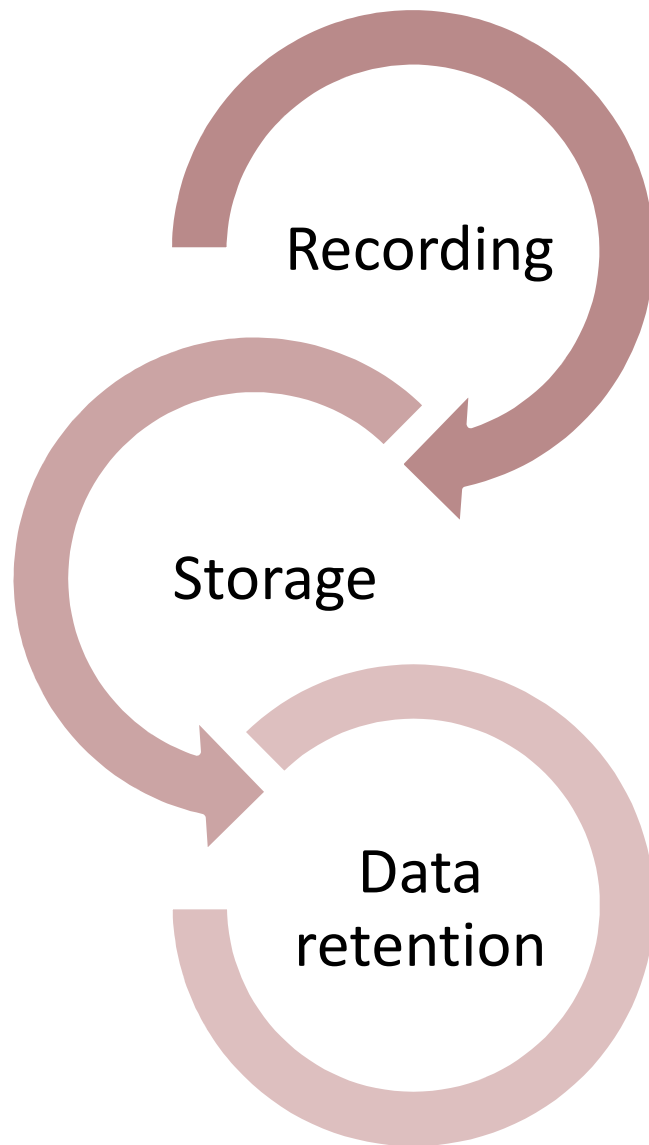
SFTP

### STORAGE & EXPORT TARGETS

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## 4. Media Storage

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- Recording voice codec supports G.711 A-law, G.711  $\mu$ -law, G.722, G.722 stereo, G.729, iLBC
- Recording video codec support: H.264 SVC
- Real time transcoding to: GSM-FR, MSADPCM, Speex, PCM, G.723.1
- Recording Servers stores media locally and upload according to schedule to storage
- Metadata is inserted directly to the database
- Uploaded media in Year/Month/Day folder structure on storage
- Database contains all available metadata including media file location
- 1 hour call media size in WAV container with GSM codec: 6 Mbyte
- Optional PKI based encryption, digital signature and key management
- Integration with WORM storage (NetApp SnapLock, EMC Isilon SmartLock, EMC Centera, IBM TSM, Hitachi)
- Integration with compliance archives (Bloomberg Vault, HP Digital Safe, Smarsh)
- Policy based data retention rules
- Supports any Windows compatible drives/folders
- Customizable storage targets (e.g. separate archiving destinations for each group)
- Deletion rules
- Bulk data export/import for easy management
- Legal hold support

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## 4. Media Storage - Storage targets

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Storage Targets	Upload	Export	Playback	Move Media	Transcode	Delete	Archive in Database	Archive in DB & Move Media
Media Repository Local Disk	✓	✓	✓	✓	✓	✓	✓	✓
Network Storage (SMB, DFS)	✓	✓	✓	✓	✓	✓	✓	✓
NetApp SnapLock	✓	✓	✓	✓	✗	✓	✓	✓
EMC Isilon SmartLock	✓	✓	✓	✓	✗	✓	✓	✓
EMC Centera	✓	✓	✓	✓	✗	✓	✓	✓
Hitachi Content Platform	✓	✓	✓	✓	✗	✓	✓	✓
Azure Storage (2016Q3)	✓	✓	✓	✓	✓	✓	✓	✓
Amazon S3	✓	✓	✓	✓	✓	✓	✓	✓
IBM Tivoli Storage Manager	✓	✓	✓	✓	✗	✓	✓	✓
Bloomberg Vault	✗	✓	✗	✗	✗	✗	✗	✗
Smarsh	✗	✓	✗	✗	✗	✗	✗	✗
External Verba Media Repository	✓	✓	✗	✗	✗	✗	✗	✗
SMTP	✗	✓	✗	✗	✗	✗	✗	✗
O365 Compliance Archive (EWS)	✗	✓	✗	✗	✗	✗	✗	✗
SFTP	✓	✓	✗	✗	✗	✗	✗	✗

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## 5. Microsoft SQL database

Verba uses a standard Microsoft SQL Server database to store the system configuration parameters for each Verba server and the conversation metadata (CDR) for each conversation.

Version (Express, Standard or Enterprise editions) support:

- SQL Server 2008 R2
- SQL Server 2012
- SQL Server 2014
- SQL Server 2016

The database can be located on one of the Verba servers, a standalone server, or a highly available company SQL infrastructure.

Supported High Availability features:

- Mirroring
- Always-on availability groups
- Log shipping

# Turret phones

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Trading floors have some very unique requirements:

- Dedicated point 2 point connection between traders at different rooms, organizations
- Hotlines, ARD (automatic ring down), MRD (manual ring down)
- Intercom
- Always connected lines (hoot n holler, shout down):
  - Ability to listen on all these lines
  - Ability to answer/talk to all, some of or particular of these lines
- Traders also need traditional PBX features

Special phones supporting:

- Multiple lines
- Multiple concurrent calls
- Multiple devices:
  - Handsets
  - Speakers
  - Microphone



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# Recording issues

Turret vendors usually provide active recording interface.

The followings should be considered due to the special call flows:

- Single turret depending on vendor might have 32-100s of ongoing call sessions. Recording all of these sessions is challenging due to network, computational power, license and storage scalability issues
  - Vendors provide possibility to mix the channels (and customize mixing layout) and record the mixes, so number of media channels to be recorded can be lowered significantly
- Call sessions might start at user login and end only at logout resulting in extremely long calls. Open lines most of the time just stream silence.
  - To make easier searching in the recordings and access the recordings in timely fashion Verba can split the recording into multiple records. The splitting timer can be configured. For example, if timer is set to 1hr then a 24hr session is recorded in 24 1hr recordings
  - Turret platform might detect silence and do silence suppression, ie. if there is no voice activity it stops sending media to the recorder. Verba can detect these gaps and if media inactivity timer elapses it stops the ongoing record and when media starts coming creates a new record.
  - We recommend using Speex or Opus storage codec. These supports voice activity detection and silence suppression so if turret still streams silence on open-lines the long silent part can be compressed extremely efficiently.



# Optimized data model for trader voice recording



- **Requirement:** ability to store a single copy of the media in case of mixed recording channels or TPO based recording where multiple calls are referencing a single media entry, before Verba stored separate/duplicate media files for each CDR
- **Implementation:** many to many relation is supported by introducing CDR-only and media-only record types. CDR-only records contain CDR information and reference to one or more media-only records
  - Periodical record splitting
  - Voice activity detection based on RTP/DTX if turret supports it (multiple media for single or multiple CDRs)
  - One media-only record is shared across multiple CDR-only records (channel mixing, TPO recording)

# Optimized data model for trader voice recording

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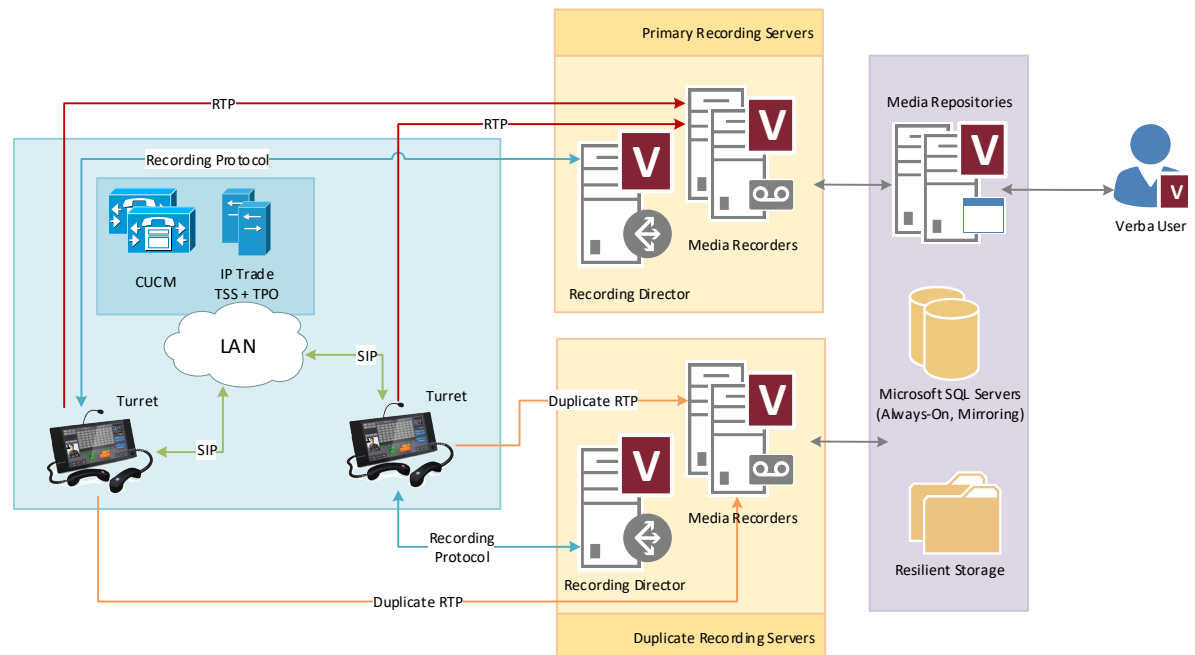
- Data management policies
  - Data retention: set for both CDR-only and media-only records in Verba, on WORM storages: only media-only records have retention period setting
  - Deletion: media-only records have their own retention but even so, cannot be deleted until a CDR-only record references it.
  - Voice quality check and transcoding: applies to media-only records
  - Transcription, phonetic indexing: supported for CDR-only records using media stitching
- Search: CDR-only (and standard) records are shown by default, user can switch to show media-only records as well
- Playback: requires post processing to stitch and cut media-only records to CDR-only records. Seamlessly integrated into web based playback, media files are generated temporarily and cached
- Export: calls can be exported either with stitched media (standard model) or as per turret model
- Import: both standard and turret model is supported
- Desktop/agent screen recording: not supported

Verba Trader Voice Recording

# IPTrade

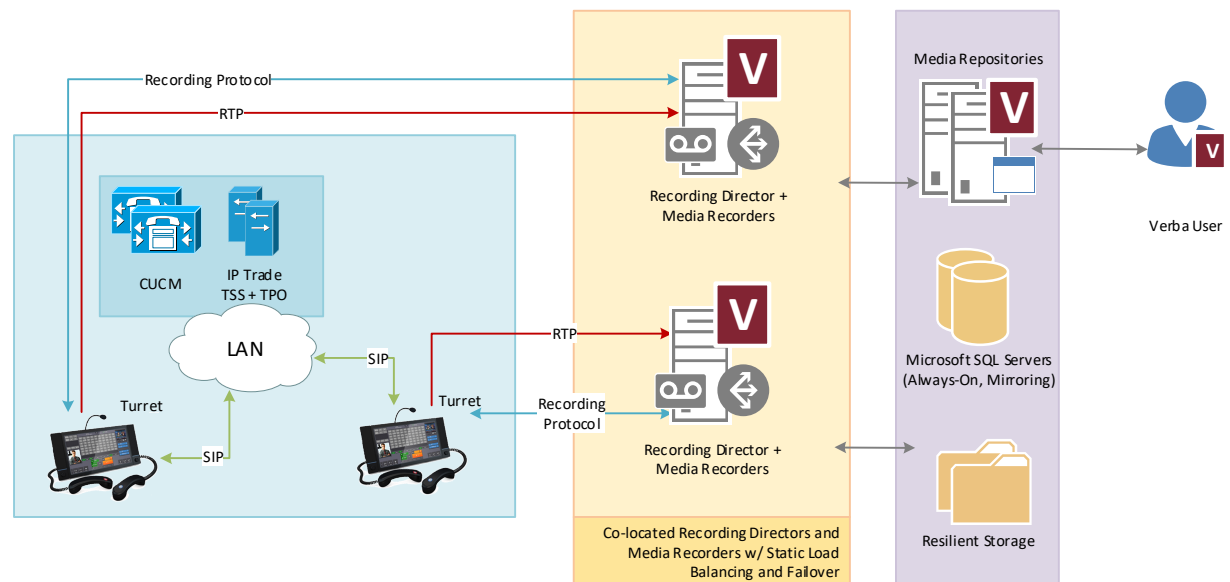
# IPTrade - 2N Recording

- Primary and Secondary/Duplicate Recording Server groups (2N recording) recording the same conversation
- Turret establishes session with both Primary and Secondary/Duplicate Recording Directors
- When call starts a Media Recorder is selected according to the load-balancing configuration, Media Recorders are allocated on a per recording session basis
- Next-call failover is supported inside the Recording Server groups in case of Media Recorder failure
- When a Recording Director fails, 2N recording is no longer available, only single copies are recorded



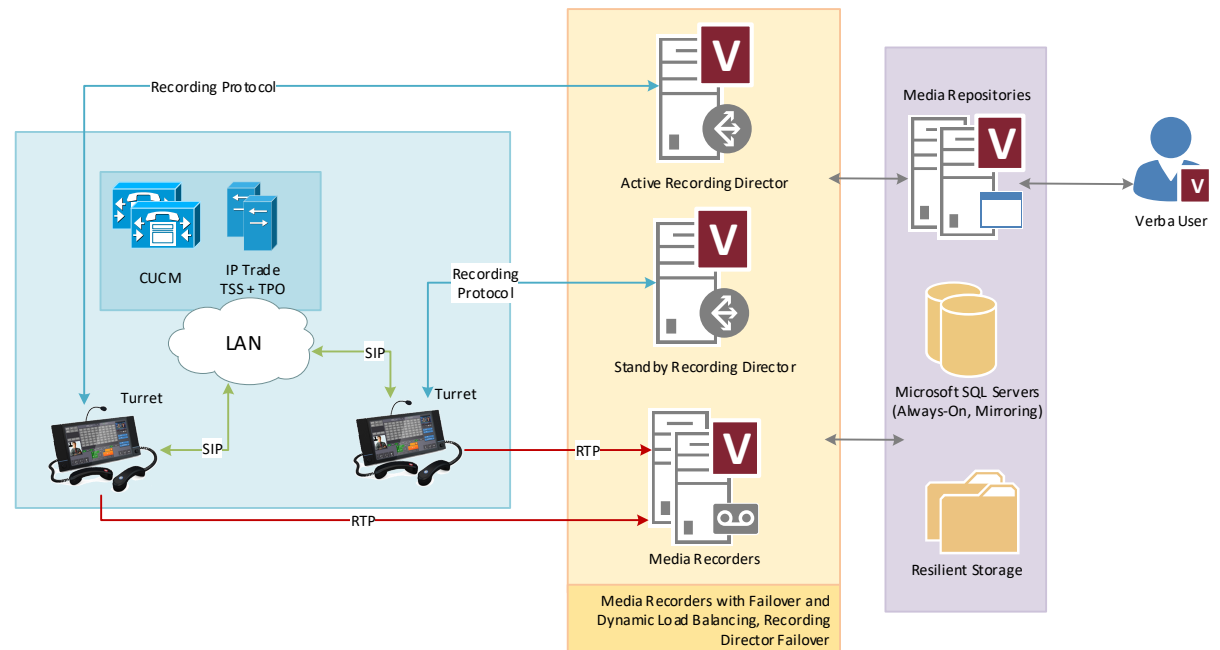
## IPTrade - N+1 Recording, static load-balancing

- Recording Directors and Media Recorders are deployed co-located, turret based load balancing is configured statically in the IPTrade, 2 Recording Servers can be configured for each turret
- Both Active and Standby Recording Servers (Co-located Recording Director and Media Recorder) receive CTI events from the turrets, Standby Recording Servers listen for “backup” recording events only
- When a Recording Server fails, the affected turrets will re-register at the other Recording Server and recording continues
- Failover time is 1-2sec depending on the Keep Alive timer setting



# IPTrade - N+1 Recording, dynamic load-balancing

- Recording Directors are deployed separately for dynamic (per recording session based) load balancing, 2 Recording Directors can be configured for each turret
- Both Active and Standby Recording Directors receive CTI events from the turrets, Standby Recording Director listens for “backup” recording events only
- When a Media Recorder fails, the affected turrets will re-register at the other Recording Director and recording continues at an available Media Recorder
- When a Recording Director fails, the affected turrets will re-register at the other Recording Director and recording continues at an available Media Recorder
- Failover time is 1-2sec depending on the Keep Alive timer setting





# Verint Verba v9.2 for BT IPTrade

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- TPO based recording
- New optimized data model for trader voice recording
- Added support for new metadata fields, new IPTrade specific custom metadata template
- Microphone events are stored as markers (Idle, Exclusive, Public)
- Reconcile duplicate recordings
- SfB side recording of IPTrade turrets
- Update performance and sizing

# Reconcile duplicate recordings

- **Requirement:** ability to reconcile duplicate recordings and keep the best copy only
- **Implementation:** new data management policy (post processing)
  - Looks for 2N recordings (id + call time)
  - Looks for related media records and calculates an overall quality score based on voice quality check score and/or received RTP counters
  - Keeps the best copy and removes the other
  - Runs on Media Repository / Application Server after calls are uploaded from the recorders
  - Full audit trail
- **Considerations:**
  - Calls on WORM storages are not supported
  - Time synchronization: servers clocks must be in sync to be able to correlate recordings properly (< 3 seconds)
  - Open lines: when the primary or the secondary recorder is stopped or restarted, open line recordings which were already going, cannot be reconciled due to timestamp mismatch

- **Requirement:** TPO based recording
- **Implementation:**
  - A recorded TPO line creates a recording session and sends updates the session with the list of joined/leaving turrets. A new field in the call object describes the logged in user on the turret.
  - Verba creates a single media-only record and multiple CDR-only records, CDR-only records are assigned to traders/users.
  - Call level user information is taken into account during evaluating recording rules and assigning calls to owner/user
  - TPO based recording is configured for the TPO line number in Verba and can be assigned to a technical user
- **Considerations:**
  - Different retention period configurations cannot be implemented for the same TPO line, because media-only records for TPO lines will have their own retention setting

# New meta data fields and events

- **Requirement:** ability to store all available meta data fields and new microphone events
- **Implementation:**
  - New custom meta data template for IPTrade, stored for each recorded conversation when available: Slot, Type, Channel ID, Device ID
  - Microphone events/talk states are stored as markers, displayed on the waveform in the player

with timestamp information

Conversations

1 item found, displaying all items.

Results per page

20

<

Verba Collaboration Compliance Platform

# User interface

# Transcription search & playback

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The screenshot displays the Verba transcription search and playback interface. On the left, the 'Search' sidebar includes sections for 'Basic Search Options', 'Advanced Search Options', 'Metadata and Markers', and 'Instant Messaging / Transcript (\*)'. The 'Instant Messaging / Transcript (\*)' section is active, showing a search in 'Both' with the phrase 'microsoft' entered. A red arrow points from the 'Full-text search' label to the search input field.

The main 'Conversations' section shows a table of search results. The first result is a call from Sharon Harrington to 1-800-5551234 on April 30, 2014. The transcript snippet shows the word 'Microsoft' highlighted in yellow. A red arrow points from the 'Search-hit highlight' label to this highlight.

Below the search results is the 'Conversation View' section, which features a timeline and a waveform. The timeline shows various time markers (e.g., 00:00, 05:15, 10:31, 15:46, 21:02, 26:18, 31:33, 36:49, 42:04, 47:20, 52:36). The waveform shows the audio playback. A red arrow points from the 'Synchronized playback highlight' label to the waveform.

At the bottom, the 'Transcription' section shows the full transcript of the call. The transcript includes a greeting and a discussion about the company's financials. The word 'Microsoft' is highlighted in yellow in the transcript. A red arrow points from the 'Phrases with low confidence score' label to this highlight.

Annotations with red arrows and labels are present:

- Full-text search**: Points to the search input field in the 'Instant Messaging / Transcript (\*)' section.
- Search-hit highlight**: Points to the highlighted word 'Microsoft' in the search results snippet.
- Synchronized playback highlight**: Points to the waveform in the 'Conversation View' section.
- Phrases with low confidence score**: Points to the highlighted word 'Microsoft' in the transcript.

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# Video call playback

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# Case management

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Case Details

[Add New Case](#)  
[Back to Previous Case List](#)

Case Information

ID\*

2

Title\*

Jackman vs Stark (GT7463)

Description

Communications related to Jackman vs Stark (GT7463)  
Legal hold investigation related to FCA request 2016L-467

Owner\*

Verba Administrator (Administrator)

Conversations Included

# of Conversations

4058

First Conversation - Last Conversation

11/6/15 8:38:18 AM - 4/5/16 9:21:36 PM

# of Users Involved

7

Top 5 Users Involved

Thomas Powell (thomas): 608  
Jerry Jones (jerry): 603  
Sue Mathis (sue): 593  
Michael Cohen (michael): 585  
Wesley Mack (wesley): 567

Count Conversations

List Conversations

Concern Labels

Add Label

New label

	Label	Description	# of Conversations	First Conversation - Last Conversation	# of Users Involved	Top 5 Users Involved
<input type="checkbox"/>	<a href="#">Exclude from Case</a> <b>Calls to Jackman &amp; Baker</b>	Requested calls between us and Jackman & Baker	4030	11/6/15 8:38:18 AM - 3/10/16 11:45:36 PM	7	Thomas Powell (thomas): 601 Jerry Jones (jerry): 596 Sue Mathis (sue): 587 Michael Cohen (michael): 582 Kenneth Franklin (kenneth): 563
<input type="checkbox"/>	<a href="#">Exclude from Case</a> <b>Suspected Compliance Issues</b>	Potential compliance issues found by our Compliance Office	13	1/24/16 10:10:59 PM - 4/4/16 2:52:40 AM	1	Sue Mathis (sue): 13
<input type="checkbox"/>	<a href="#">Exclude from Case</a> <b>Trades with Stark Investments</b>	Trades related to potential information leak	32	3/7/16 8:24:00 PM - 4/5/16 9:21:36 PM	6	Jerry Jones (jerry): 8 Sue Mathis (sue): 7 Thomas Powell (thomas): 5 Sharon Harrington (sharon): 4 Michael Cohen (michael): 4

View Conversations

Playback Conversations

Add/Remove Conversations

☐ Owner

☐ Select Users

☐ Everyone

Legal Hold

Legal Hold Details

Enable Legal Hold

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# Compliance workflows

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**Approval Workflow**

ID: 7

Enabled: ☒

Name: UK London - Manager and Compliance Office

Description: Approval workflow for the London team

Auto-Approve: No

Priority: 60

Template: Default

Language: English

**Approval Steps**

Move Up Move Down Remove Approval Step

Name: Approval by Manager

Approvers: Group Managers of the User's Group

Mode: Approve, Escalate or Reject

Finish Workflow if Approved: ☒

Deadline (Hours): 48

Reminders (Hours): 24

Move Up Move Down Remove Approval Step

Name: Approval by Compliance Office

Approvers: Group Managers of Selected Groups

Groups: Administration G, Customer Service Default, Tech Group, UK - London City

Mode: Approve or Reject

Finish Workflow if Approved: ☒

Deadline (Hours): 168

Reminders (Hours): 24

Current Members of UK - London City Traders

User Name	Member	Supervisor	Investigator	Administrator	Manager	Primary Group
Carrie Reid (carrie)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chad Gray (chad)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jerry Jones (jerry)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kenneth Franklin (kenneth)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Michael Cohen (micheal)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sharon Harrington (sharon)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sue Mathis (sue)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thomas Powell (thomas)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wesley Mack (wesley)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Compliance Issue	Mar 20, 2016 11:45:36 PM 00:04:23	123622317	1939	Sue Mathis
Compliance Issue	Mar 18, 2016 3:36:00 PM 00:00:51	143123536	1939	Sue Mathis
Compliance Issue	Mar 12, 2016 5:31:12 PM 00:04:09	112359244	1939	Sue Mathis
Compliance Issue	Mar 12, 2016 2:24:00 PM 00:02:14	123289324	1939	Sue Mathis
Compliance Issue	Mar 12, 2016 7:40:48 AM 00:00:32	123816011	1939	Sue Mathis

**Group Data**

Enable Active Directory Synchronization: ☐

Group Name: UK - London City Traders

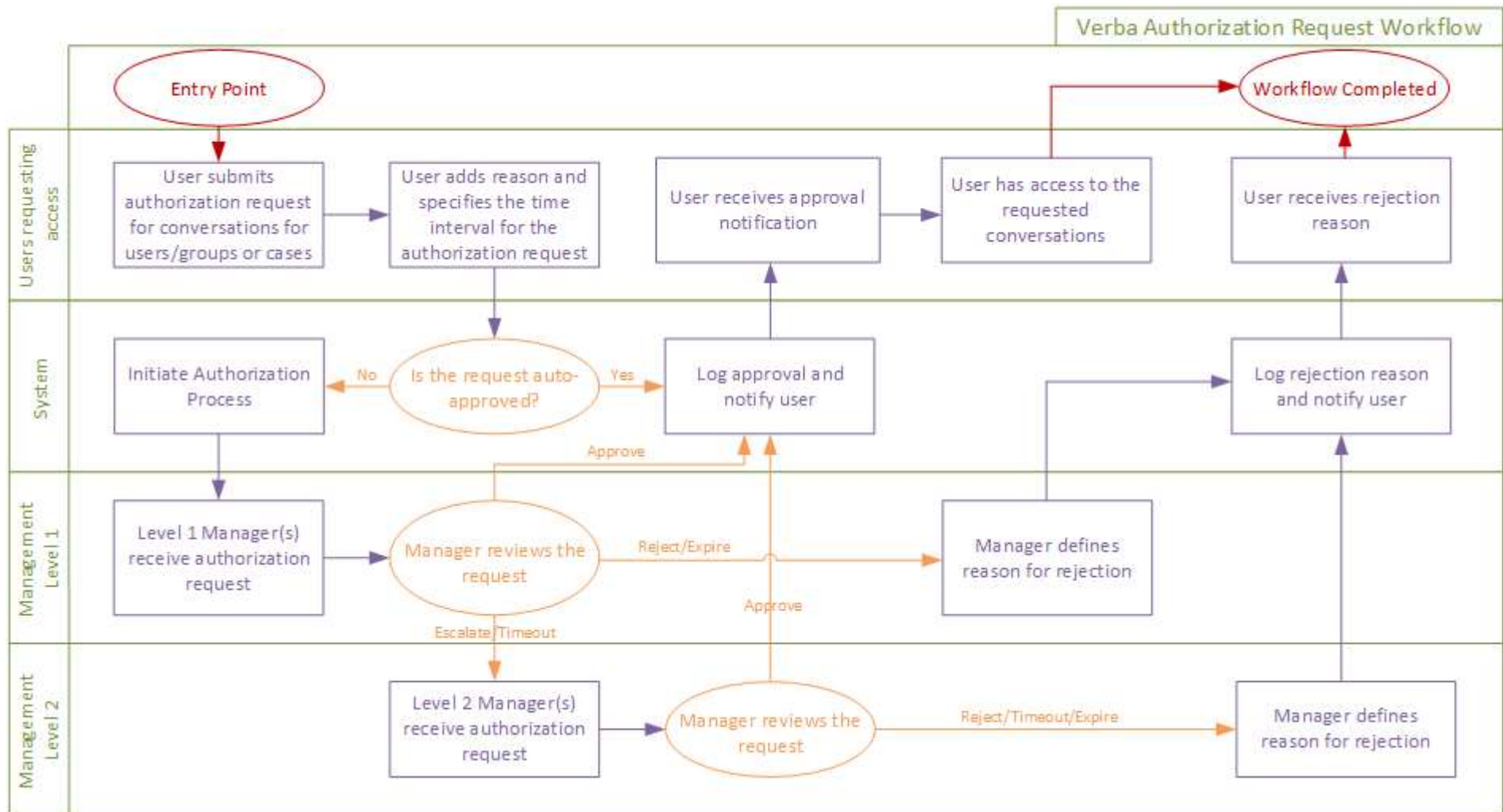
Metadata Template: Trade Reconstruction Information

Authorization Workflow: UK London - Manager and Compliance Office

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# Compliance workflow

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# Speech search

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**Search**

Basic Search Options

Advanced Search Options

Metadata and Markers

Instant Messaging

Speech Search (\*)

Language English (United States)

Confidence all (>0%)

Search in ☒ both ☐ recorded party ☐ other party

Note! Longer phrases will result in better precision.

All of these phrases

Any of these phrases

microsoft

None of these phrases

Create speech labeling rule from these

Reset Search

















































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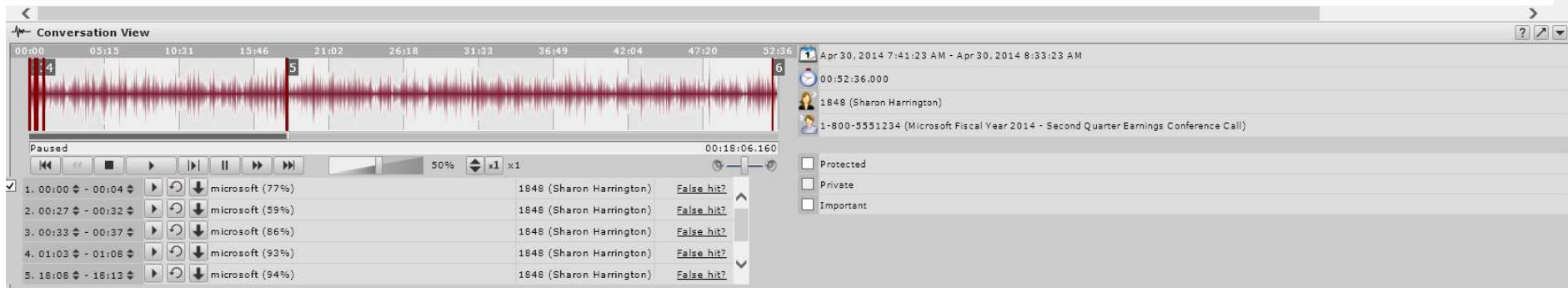
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    	74%		Apr 30, 2014	8:18:00 AM	01:07:00	1848	Sharon Harrington	1-800-5551234	SAP 2011 Earnings Call with Bill McDermott
    	94%		Apr 30, 2014	7:41:23 AM	00:52:00	1848	Sharon Harrington	1-800-5551234	Microsoft Fiscal Year 2014 - Second Quarter Earnings Conference Call
    	93%		Apr 30, 2014	7:30:08 AM	00:56:00	1848	Sharon Harrington	1-800-5551234	Google Q3 2011 Earnings Call
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