



Multi-Modal Communication

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Report Documentation Page

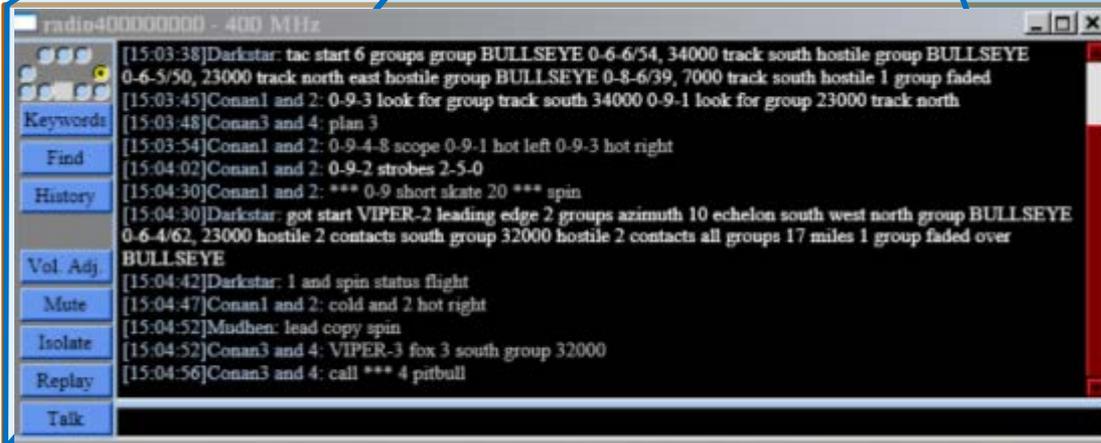
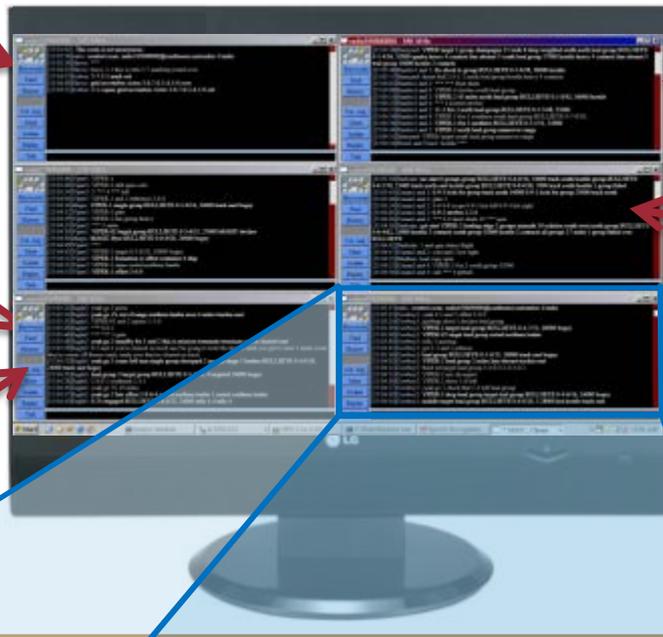
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Multi-Modal Communication





Spatial Audio

- **Spatializing communication into virtual locations increases intelligibility by 30 – 40% as well as reduces listener's perceived mental workload**





Capture and Display of Radio Messages



- Real-time speech-to-text transcription of radio messages
- Audio files are recorded and linked to transcription
 - Messages can be replayed in faster than real time
- Messages are timestamp

[1] radio450000000 - 450 MHz

Play Stop Revise Annotate Tags: [Pb] [Pb] [Pb] [Pb] [Pb] A- A+ R X

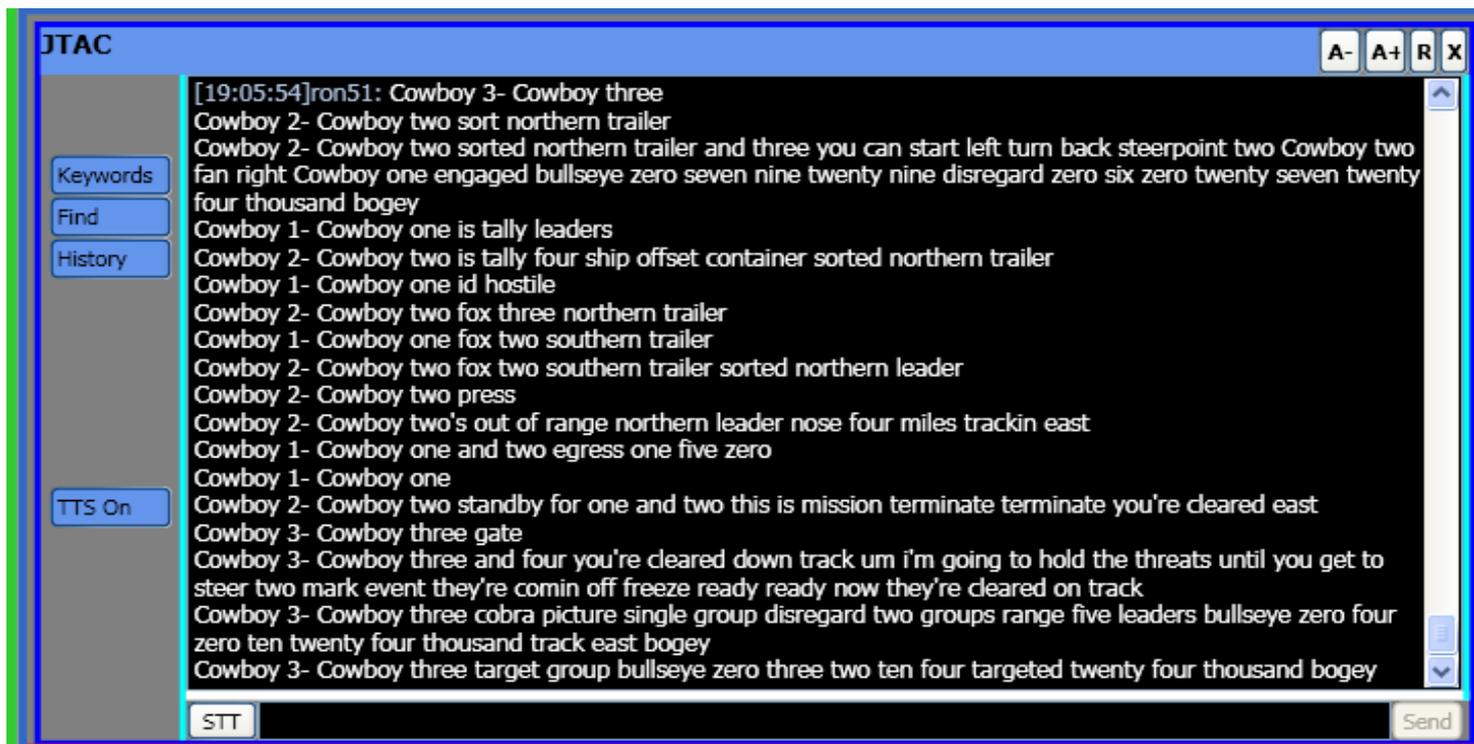
[20:40:54]Cowboy3: cowboy-03 passing
[20:41:00]Cowboy1: cowboy-01 and 2 jettison
[20:41:09]Cowboy1: cleared group BULLSEYE 0- 5- 0 /15 28 ,000 track east bogey
[20:41:16]Cowboy2: cowboy-02 lead group 2 miles line abreast tracking east
[20:41:24]Cowboy3: airedale target lead group 3 and 4 and uh freeze you up and reload you
[20:41:28]Cowboy2: cowboy-02 say 0- aspect
[20:41:33]Cowboy2: cowboy-02 show 1-6 left
[20:41:41]Cowboy1: cowboy-01 check that 1-4 left lead group
[20:41:52]Cowboy2: cowboy-02 drop lead group target trail group BULLSEYE 0- 4- 6 /16 24 ,000 bogey
[20:42:07]Cowboy1: cowboy-02 ID the group BULLSEYE 0- 6- 0 /20 can re-form 88 ,000 HOSS COWBOY track east
[20:42:17]Cowboy2: cowboy-02 targeted trail group BULLSEYE 0- 4- conans out /13 24 ,000 sorted northern trailer
[20:42:18]Cowboy1: cowboy-01
[20:42:27]Cowboy1: cowboy-01's egress 3- 0- 5-0
[20:42:34]Cowboy2: cowboy-02's dropped lead group
[20:42:39]Cowboy1: cowboy-01 that bandsaw right third cowboy-02 fan right too
[20:42:48]Cowboy3: cowboy-03 come left
[20:42:53]Cowboy1: cowboy-01's tally threat



Text-Chat



- Sends and receives Chat messages
- Chat input via typing or speech-to-text (STT)
- Chat messages can be heard with text-to-speech (TTS)





Edit / Annotate Messages



- ASR is not 100% accurate
- Messages can be edited to reflect the correct information
- Text can be formatted to user's preference
- Ability to copy and paste
- Operators can leave notes to themselves for later review or debriefings

The top window, 'radio45000000 - 450 MHz', displays a list of messages. A red arrow points from the text 'Messages can be edited to reflect the correct information' to a message entry: '[17:12:36]Cowboy3: cowboy-03 drop lead group gimbal airedale target'. Below this message, a text box contains the edited text: '1. cowboy-02 drop lead group gimbal airedale target' and '0. cowboy-03 drop lead group gimbal airedale target'. Another red arrow points from 'Text can be formatted to user's preference' to the message: '[17:13:02]Cowboy3: can a all target group BULLSEYE 0- 6- 5 /28 28 ,000'. The bottom window, 'radio35000000 - 350 MHz', shows a similar list of messages. A red arrow points from 'Operators can leave notes to themselves for later review or debriefings' to a message entry: '[17:12:03]Rambo1 and 2: rambo-02 group BULLSEYE 0- 5- 6 /38 36 ,000 hostile'. Below this message, a text box contains the note: 'This room is not anonymous.'



Accessing Information



- 'Find' function allows operators to search for specific words or phrases
- Flag lines of communication for easy retrieval
- 'History' goes to particular times

The screenshot displays two windows of a radio communication interface. The top window is titled "[3] radio300000000 - 300 MHz" and the bottom window is titled "[12] radio450000000 - 450 MHz". Both windows have a search bar at the top with the word "hostile" entered. The search results are displayed in a list format, with each line representing a communication transcript. The transcripts are color-coded and include timestamps and call signs. The interface also features various control buttons such as "Play", "Stop", "Revise", "Annotate", "Tags", "Previous", and "Next".

Red arrows from the text on the left point to the following features in the interface:

- The search bar in the top window, labeled "Find function allows operators to search for specific words or phrases".
- The search results in the top window, labeled "Flag lines of communication for easy retrieval".
- The search bar in the bottom window, labeled "'History' goes to particular times".



Keyword



- User defined keywords are highlighted
- Counts number of messages since channel was last visited

[18] radio300000000 - 300 MHz

Keywords
Find
History

TTS On
Vol. Adj.
Mute
Isolate
Replay
Talk

[20:34:36]Eagle3: eagle-01 and 2 gate
[20:34:45]Eagle2: eagle-02 say aspect of the lead group track 0- 7- 0 want bandsaw 2 untargeted 0 02
[20:34:53]Eagle3: hud eagle-03 drop lead group gimbal cobra uh target
[20:35:03]Eagle3: eagle-03 target trail group now **BULLSEYE** 0- 5- 5 /28 24 ,000
[20:35:06]Eagle1: eagle-01 sorted northern trailer
[20:35:16]Eagle3: cobra targeted lead group **BULLSEYE** 0- 6- 5 /28 28 ,000 track east bogey
[20:35:21]Eagle3: eagle-01 and 2 shackle
[20:35:27]Eagle1: eagle-03's 10 miles power hud 30
[20:35:38]Eagle3: eagle-03's engaged **BULLSEYE** 0- 6- 2 /25 24 ,000 tally 2-4 tally 2
[20:35:41]Eagle1: eagle-01 and 2 cross turn
[20:35:47]Eagle3: eagle-03's ID hostile hostile
[20:35:52]Eagle2: eagle-02 fox-2 northern trailer
[20:35:58]Eagle3: eagle-03 fox southern trailer
[20:36:04]Eagle3: eagle-03's out east below 20
[20:36:12]Eagle3: eagle-03 this is mission terminate you're cleared out east
[20:36:15]Eagle1: eagle-01's ready
[20:36:19]Eagle1: eagle-01 you're cleared on track
[20:36:31]Eagle1: can 01 cobra-03 target 2- groups 0 /10 15 north group **BULLSEYE** 0- 1- 0 /15 22 ,000 track east bogey
[20:36:42]Eagle3: eagle-01 and 2 offset 2- 9- 0 south group **BULLSEYE** 0- 7- 5 /7 28 ,000 track east bogey



Multi-Modal Communication



Questions?

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