Namaste Use Cases

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Voice and Text Applications Under Study

2m repeater operation
2m simplex operation
2m SSB operation
HF operation
Skype Instant Messaging
Skype Voice
Jabber/AOL/etc Instant Messaging
SMS
Cellular voice
POTS
In-home intercom
Voice mail
Answering machine
Voice menus
D-Star
AOR/G4GUO HF digital voice
In-person conversation
Teamspeak
Echolink
IRLP
Linked repeater systems (Condor, etc)
Autopatch
ICQ
IRC
Everquest IM/group advertisements
Thrane & Thrane BGAN Terminal

Identified Features

Caller ID
Voice mail

Voice Communications Behavior

I. Passive Monitoring
    A. User Monitors a common calling channel.
        1. A common calling channel exists by convention.

2. A common calling channel exists by design.

B. User tunes around.

1. It should be easy to find busy channels.

2. If there are a lot of channels, would it be difficult to find busy channels?

3. User turns on radio in order to find out the conditions, telemetry, reports, signal qualities, and other usage, demographics, and information. A summary quick-look of activity.

4. Is there a purely distributed way to do 3. above or is a central serving process necessary?

C. User Selectively Squelches Receiver

1. An individual user or user group is identified by a unique code.

2. Anyone that wants to talk to another individual user has to transmit that code.

3. The radio stays silent until someone uses the code to "wake up" the intended recipient of the communication.

4. Sender-initiated.

D. User has a friends list.

1. User is alerted when a friend starts talking

a) User is alerted when on any channel.

b) User is alerted when on my channel.

c) User is alerted when on some other specific channel(s).

2. Receiver-controlled.

E. User relies on presence awareness.

1. Do you have to transmit to be counted as present?

2. Do you have to register in advance?

II. Conversation

A. User employs one-way transmission.

1. User calls CQ.

a) From where is the user calling?

b) What is a channel in this context?

c) Does CQ establish a new channel?

d) Does CQ occupy a particular existing channel?

e) Is there a presence awareness CQ status?

f) Directed CQs have an object such as region, contest, or name.

g) Is CQ a voice transmission or some kind of text message?

2. User transmits a bulletin, announcement, or broadcasts a message.

a) Is there a special broadcast channel?

b) Does a broadcast establish a new channel?

c) Is the transmission voice or text?

i) like APRS?

ii) Worms here.

3. User sends a test transmission.

a) Should there be something like a test server such as in Skype, Echolink?

b) Is there a way to do this without going through the vocoder?

c) Should there be some way to query satellite regarding signal quality?

B. User is involved in a QSO.

1. One-to-one, round-robin, and conference are not differentiated.

2. Does a QSO create a new channel or room or is a QSO assigned to an existing channel or room?

3. If there is any sort of operating schedule required, then convenient ways to predict and alert when the schedule changes and then allow transmissions when the system is available are going to be useful.

III. Unattended monitoring

A. Set your station to monitor and record all or some specific types of activities. Come home and find 100 hours of conversations on the recorder. Like a satellite ground station DVR. Unattended recording allows indexing.

IV. Emergency Communications

A. Requires special priority or QoS?

1. Priority bit is set in the frame.

2. Use a different set of preambles on the uplink to filter all other traffic without having to change anything else in the protocol.

a) Established set of EmComm preambles

b) One-time-use set of EmComm preambles.

3. Ensure bandwidth is reserved for EmComm by having a separate protocol.

B. Interface at the audio level to and from the ground station.

1. Simple as a microphone and speaker out cable, which supports any communications device including a digitally trunked HT, a telephone, or any other mobile or portable rig that is being used in the system under emergency.

2. Remote gateways provide a link to email, telephone, or any other portable or mobile system, interfaced to their audio.

C. Interface within, for example, APCO-25.

1. Requires support of different manufacturers?

2. Not everyone uses APCO-25.

3. Is there an output jack or auxiliary output in the trunked system that could be used?

D. Does the station require an amateur radio operator to be sent with it to use it in an emergency?

V. Allow for Scripting

A. Requires robust set of metadata on every set of transmissions.

B. Requires an API that provides an interface in and out of the system. A networking API so that there is separation. The thing writing the scripts needs to be separated from the

thing that is handling the radio. E.g. a socket. E.g. Bonjour, which has the notion of notifications and commands.

C. Enabled Applications

1. Graphical communications history network charts
2. Personal communications records

VI. Power on

A. Upon startup and at regular intervals, a list of channels, their usage, and signal qualities is received. This is necessary information in order to determine which channel you are going to transmit upon and can be the information needed in order to close a power control loop, if a power control loop is necessary. If it turns out that we need to transmit at maximum power all the time in order to maintain communications, well, then we'll transmit at maximum power. We won't know until we start to get some better numbers, and we're getting there as fast as we can.

VII. Station Appearance

A. Portable size
B. Digital compass
C. GPS receiver
D. SNTP
E. RJ-11
F. RJ-45
G. 802.11
H. Power
    1. AC adapter
    2. Portable power module
        a) solar
        b) ultracap-battery pack combo
        c) battery pack
I. Switches
    1. Power switch
    2. Field Setup Switch
    3. Graphical User Interface
    4. Microphone connector
    5. External speaker connector

VIII. Questions

A. Does the downlink always run at full blast?
B. How is congestion control handled?
    a) Speed cutoff
    b) Ask the system for help
C. Can you afford to send a unique ID with each frame?
    a) Use silence in the pauses of the voice and Tx ID

b) Puncture

c) If using a variable rate vocoder, use lower rate frame for IDs.

d) There needs to be a rule for initial identification, such as within the first few frames make sure you do it, then every second perhaps, which would be a 2% overhead?

D. Hardware needs to be re-assignable.

E. How do we allow for tactical IDs if the datastream has IDs?

F. Are all the subframes of a big frame of the same type or not? If so, then the protocol ID can be shared, which results in less overhead. Frame is repeated in the proposed scheme, not the subframe.

G. Regarding access classes, how about a continuous scale of access classes. This sliding access class depends on knowledge of the uplink signal at the satellite. In other words, when you pick a channel, you start transmitting on low power. Ramp up until either the satellite indicates you have been heard. If you hit the rail then start piling on the coding gain. I this doesn't work, then declare failure to the user with indications of why. If successful, then display stats. For the non-fixed-antenna cases, be prepared to make the power and coding gain adjustments dynamically (preferred) or provide enough margin (deprecated).

a) calibrate on demand?

b) closed loop power control?

H. Uplink questions

a) How are collisions detected?

b) Preambles?

c) Synchronization?

d) What can you do, is a function of losses, antenna gain, and power amplification. What you need to do in order to close the uplink is to have enough power and enough coding gain. How to determine the feedback on uplink success?

e) If you are going to use the channel anyway, then why not transmit continuously. Instead of transmitting full power for, say, 50% of the time, then transmit at half power for 100% of the time.

f) Convolutional codes go up at whatever rate is needed to achieve the link.

g) List of channels in use and their power level, Eb/No, or whatever it takes to communicate RSSI is transmitted down.

h) Close the power control loop as often as you can. At 500 channels, using 3-4 bits to express the RSSI, that's about 2000 bits every half-second or so.

i) Does the user have control over uplink margin? In the case of fast fading and/or high variability in link quality. The assumption being that we're not transmitting at full power all the time. It may indeed be necessary to transmit at full power if the link is barely closeable.

j) QoS. Why? Well, you pack frames in until you run out of room, and then at that point some have to be delayed. QoS vs. Prioritization is guaranteed bandwidth to the receiver vs. best effort from the sender. They are two different things. There is real-time data, non-real-time data, and EmComm data divisions that may be distinguished from one another in a QoS system.

I. Control questions

a) There needs to be a way to publish a bulletin from the spacecraft. For example, “emergency traffic only”. A broadcast access-controlled channel for text messages and voice that everyone must monitor? Does this require smarts in the satellite? The ground control station will do this.

b) Perhaps control can be separated from traffic by special preambles.

Less than 1mS/frame at 1800 bits/frame at 2.5Mbps