APRN™
Automatic Picture Relay Network
SSTV Picture Server

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Abstract

SSTV, Slow Scan Television; -has been around for years. In the past, it was primarily used on HF. The equipment was big, bulky, and somewhat expensive. Nobody even thought of doing SSTV on VHF or portable. With the introduction of the Kenwood VC-Hl this stereotype has changed. This paper discuses software that takes the SSTV images sent from these portable SSTV systems and automatically puts them on a server that makes these pictures available to other Hams. This allows a Ham to send his pictures to a common site that other hams can recall the pictures from using touch-tone commands. This 'PICTURE SERVER' becomes a 'picture' repeater that also enables hams that do not have a good direct. radio path to exchange pictures via this PICTURE NETWORK. In addition, the pictures can be viewed on a local network via Netscape or other web browser.

Background

Slow Scan TV was introduced in 1958. In the early days, the only way to receive SSTV was with home made hardware using long persistence phosphorus TV tubes. Then there were commercial units such as the ROBOT. Later there were software packages that ran on personal computers. One of these early programs could receive black and white SSTV images via the CASSETTE port on an Apple II. Later, there was a lot of SSTV activity on AMIGA computers. Now there are many programs that can receive SSTV pictures via a Sound Blaster card on a

PC. Mark Sproul, KB2ICI, wrote one for the Macintosh back in 1989, and there is MULTIMODE for the Macintosh that receives color SSTV pictures. There are several good programs for SSTV on Windows platforms including W95SSTV, ChomaPix, and others. In 1998, Kenwood introduced the VC-HI, Visual Communicator. The Kenwood VC-HI is a truly portable unit for doing SSTV that changes the way of thinking of how SSTV can be used. Now, many people are wanting to take the VC-Hi and a handheld radio such as the Kenwood TH-D7A into the field and transmit pictures back to 'home base.' Fire companies are doing this on commercial bands, Emergency people are using this to show what is going on the field, and Skywarn people are using it to show the weather. It truly proves the saying "A picture is worth a thousand words."

Operation

This system provides for a mechanism where people with these new portable SSTV units (or any SSTV transmitter) can go out into the field and transmit pictures back to a common picture server. Then other hams can retrieve these pictures at their convenience. In addition to convenience, it provides the ability to get the picture to someone that is further away than what would otherwise be doable via direct simplex operation. It becomes a PICTURE REPEATER. The server also acts as a common storage and retrieval location for these pictures. The pictures can also be made available to a web server, thus allowing many people to see these pictures in near real time.

When you have a picture that you want to transmit, you simply transmit it on the appropriate frequency. The server recognizes the SSTV signal and receives it. When complete, it saves the picture to a file on the local hard disk and says via VOICE over the radio, "PICTURE ONE TWO FIVE RECEIVED BY WU2Z APRN." You now know that your picture was saved as picture 125, and you can tell your friends to go get picture 125.

In an emergency, special event, or weather situation, the APRN system would work as follows:

- Hams in the field would transmit pictures, each one getting a picture number assigned to it.
- Other Hams could retrieve those pictures by picture number.

- When one person requests a picture from the server, anyone listening can receive the picture, therefore cutting down on retransmissions.
- People at the command center would be able to see the pictures as they were received via a web browser.

By using common web browser software you eliminate the need to train people in the proper usage of specialized software AND you allow many people to view the pictures at the same time.

The expected scenario would be the hams at the 'EVENT' would transmit pictures and the officials back at the command center would be able to see what is going on as it is happening. Since the pictures all get date/time stamped, you would then have a real good history to go look at after the 'EVENT' was over.

Alternatively, imagine an 'EVENT' with a "see-in" in addition to a "talk-in." You could preload the server with images of maps, local landmarks, and roads and then instruct incoming participants to view the appropriate images as part of their directions to the 'EVENT.' A sophisticated server could even transmit a SSTV image of a map back the participant with "you are here" and "the event is there." In addition, since much of the functionality of the APRN SERVER is implemented in software, the server can be as simple as an HT and a laptop that you bring to the 'EVENT.'

Software

The software has three different components.

1: The SSTV receive software, running on a Windows or Macintosh computer to receive the pictures. This software also recognizes touch-tone signals for control. It also looks at data coming in from the Packet TNC via a serial port and will associate APRS packets with the picture if present. In early versions of this system, we used ChromaPix and our software together to accomplish this.

Later we wrote our own custom software that uses a common sound card and digital signal processing software running on the Pentium to handle the SSTV and touch-tones. The sound card samples the incoming audio at 11 kHz using

16 bits per sample, which is more than sufficient to accurately represent the incoming SSTV audio signal. The incoming audio is constantly being processed by the computer's microprocessor using digital signal processing to search for either touch-tones or a SSTV signal. No special slow scan television hardware is necessary for the APRN SERVER.

2: Specialized software to create HTML web pages showing the SSTV images. This program reads the collection of pictures created by the first program and creates an HTML page with thumbnails and text comments to display the pictures. In the final version, this is built into the receive software.

3: A normal WEB Server system.

The over-the-air commands understood by the APRN Picture Server are as follows:

Rxxx Recall Picture XXX where xxx is 010 – 999

Dxxx Delete picture XXX (this can be disabled)

Lxxx Lock picture XXX so that it cannot be deleted.
It then has to be deleted manually.

Nxx List (via voice) picture numbers new in the last XX hours.

Pictures 000-009 can never be deleted and are reserved for the operator's ID screens and test patterns. Pushing 'R001' on your radio will recall a picture set up by the owner so that you know who owns and runs the Automatic Picture Radio Network system. Pictures 002 – 009 are test patterns. Picture 411 is on-screen help, and picture 911 tells you how to contact local authorities.

The server can be programmed to transmit this picture at a predetermined interval.

Pictures shipped with the APRN Server Software.

000.pcm APRN 'ABOUT' screen
001 .pcm Owner/Organization information screen
002.pcm Second Owner/Organization information screen
003.pcm All Black test screen
004.pcm All White test screen
005.pcm Red Green Blue test screen
006. pcm Cyan Magenta Yellow test screen
007. pcm Gray Scale Test Screen
008.pcm Concentric Circle Test Screen
009.pcm Text test screen

411 .pcm 'On-line' help screen.
611 .pcm A screen that tells you who to contact if there are hardware problems

The *.pcm files contain the raw pulse coded modulation bytes, without any header information, suitable for sending directly to the sound card. A received slow scan television picture will be stored as a *.pcm file, in standard graphics file format or both.

Hardware

The hardware needed for this system is simple:

COMPUTER

100 MHz Pentium
Windows 95 or Windows 98
Sound blaster card
Serial Port
Internet connection (only required for Web Server connection)

RADIO
UHF or VHF radio

Unlike repeaters, this system will probably need to be monitored regularly so having it up on a mountain top, although desirable, might not be as convenient as you might need. Therefore, putting the APRN SERVER at someone's home or office that has a good location is desirable.

Conclusion

Slow Scan TV has taken on a whole new life. It is now being used as a PORTABLE system that can be taken on a hike, or to an emergency site and used in REAL TIME. This is an entirely new and different way to use an SSTV. This brings new life and new excitement to portable VHF/UHF operations. It also provides a new way to look at the world of amateur radio. We look forward to an entirely new aspect of Ham radio enabled by portable SSTV transmitters and fancy software to allow many people to participate.

References

http://aprn.rutgers.edu	APRN picture Server
http://dorm.rutgers.edu/~ksproul/sstv.html	List of SSTV Links
http://www.kenwood.net	Kenwood
http://dorm.rutgers.edu/~ksproul/sstvhistory.html	History of SSTV (W9NTP)