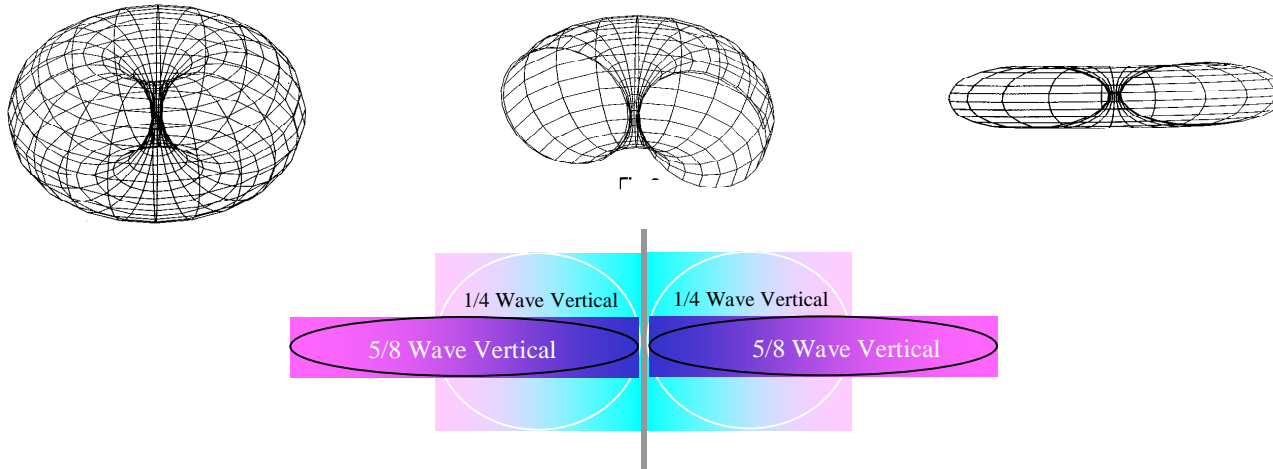## *Commutations & Operations*

AGENDA

q Repeaters and Repeater Operation

q Gateways

Commutations & Operations

Antenna Gain

q Antenna Gain: Achieved by altering the radiation pattern of an antenna

  u Same amount of power exists, but is spread over a condensed are a

  u Isotropic antenna is usually used as the reference

    v Gain referenced to an isotropic antenna is expressed in dBi

  u Dipole antenna may be used as the reference

    v Gain referenced to a dipole antenna is expressed in dBd

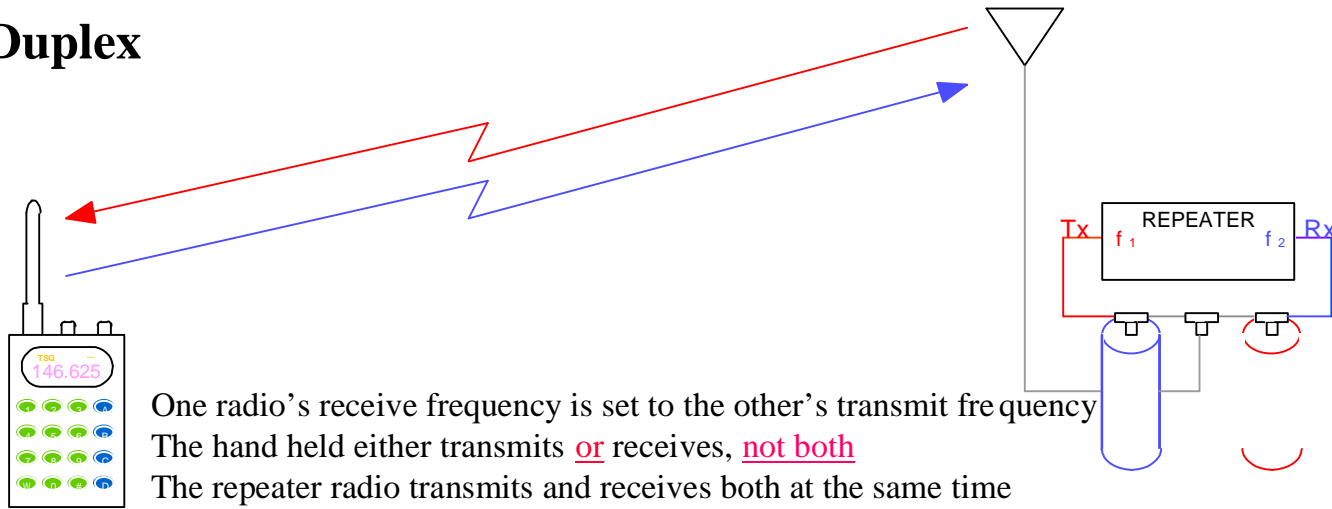# *Commutations & Operations*

Repeater Communications
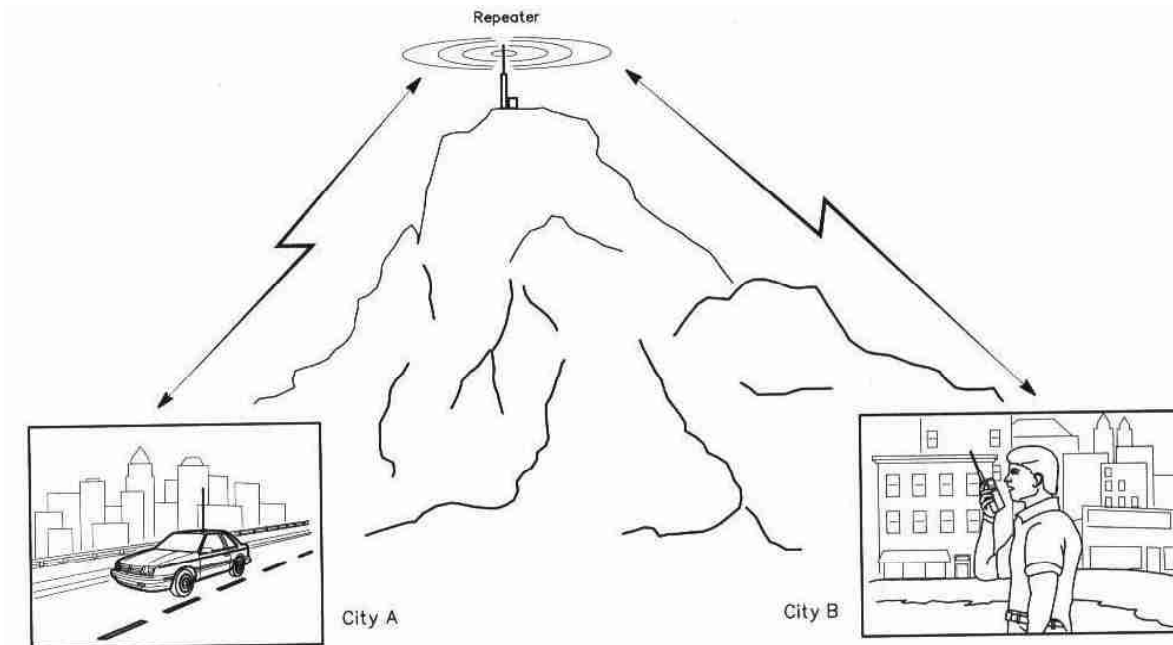
Commutations & Operations

Repeater Operations

q Basics
  u Enhance mobile and low-power operations
  u Pause briefly between transmissions
  u Give call sign to break in

q Checking the reverse
  u Listening to the repeater input frequency (reverse) to see if simplex is practical

q Frequency Coordinator
  u A person or group that recommends frequency pairs for repeater use
  u Repeater interference resolution is the responsibility of the repeater operators

q Repeater Identification
  u Identify in either voice or CW mode (CW may not be more than 20 wpm)

q Full Quieting
  u The condition when the audio signal overcomes all noise in the receiver

q VHF & UHF communications should be used to avoid tying up the HF bands

Duplex

REPEATER
Tx f_1 f_2 Rx

TSQ
146.625

One radio's receive frequency is set to the other's transmit frequency
The hand held either transmits <u>or</u> receives, <u>not both</u>
The repeater radio transmits and receives both at the same time

REPEATER INPUT/OUTPUT OFFSETS

Local 2-Meter Frequency Pairs

	RADIO RX/RPTR TX	RAD IO TX/RPTR RX
PPFMA:	146.970	146.370
CMRG:	147.345	147.945
CSARA:	146.625	146.025
UCCS:	145.265	144.665

Commutations & Operations

ᑫ SUB AUDIBLE TONES

- ® Inserted under the voice band to alert the receiver of an incom ing signal
- ® Used to discriminate between unwanted signals or noise.

Continuous Tone Coded Squelch System (CTCSS) (PL®)

				Additional Tones that may be found on some systems
67.0 - XZ	**97.4** - ZB	**141.3** - 4A	*206.5* - 8Z	
69.3 - WZ	**100.0** - 1Z	**146.2** - 4B	*210.7* - M2	159.8
71.9 - XA	**103.5** - 1A	**151.4** - 5Z	**218.1** - M3	165.5
74.4 - WA	**107.2** - 1B	**156.7** - 5A	**225.7** - M4	171.3
77.0 - XB	**110.9** - 2Z	**162.2** - 5B	*229.1* - 9Z	177.3
79.7 - WB	**114.8** - 2A	**167.9** - 6Z	**233.6** - M5	183.5
82.5 - YZ	**118.8** - 2B	**173.8** - 6A	**241.8** - M6	189.9
85.4 - YA	**123.0** - 3Z	**179.9** - 6B	**250.3** - M7	196.6
88.5 - YB	**127.3** - 3A	**186.2** - 7Z	*254.1* - 0Z	199.5
91.5 - ZZ	**131.8** - 3B	*192.8* - 7A		
94.8 - ZA	**136.5** - 4Z	*203.5* - M1		

ᑫ Italic frequencies may or may not be present on your radio

- ᑌ Orange not on ARRL list
- ᑌ Green not on Yaesu radio

Repeater Frequency Spacing
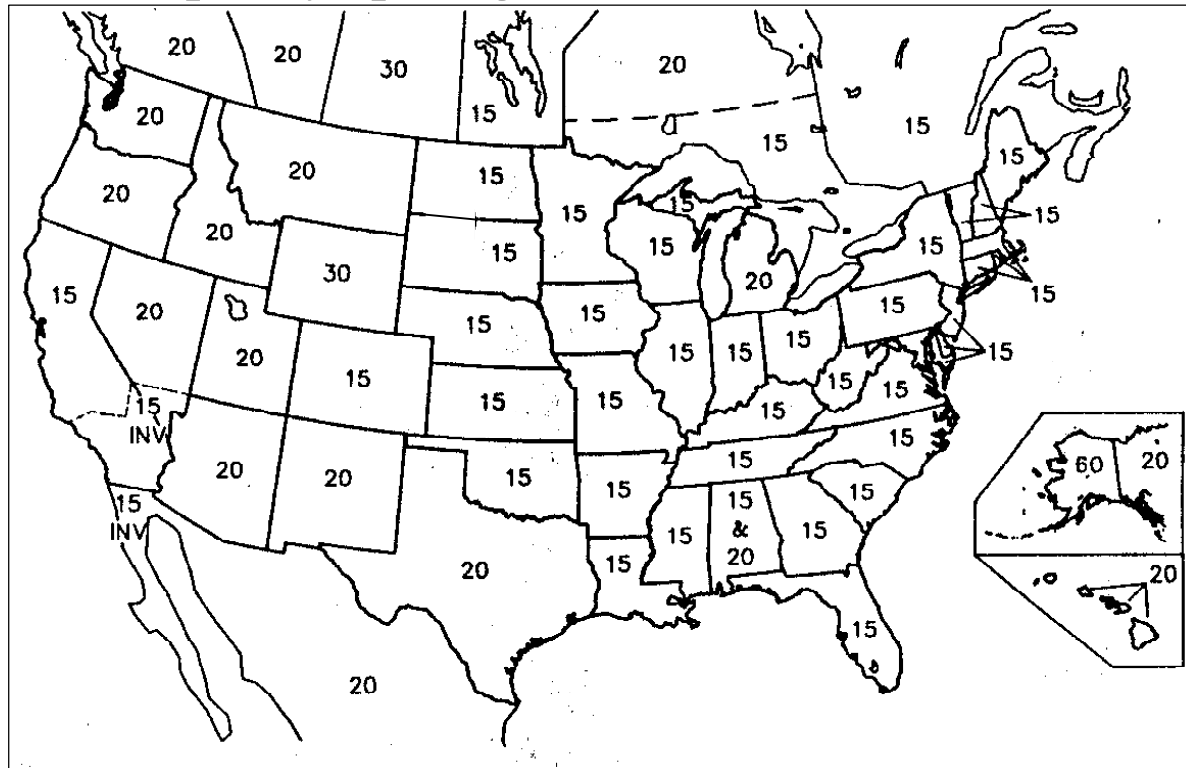
Autopatch

○ **Autopatch:** Allows repeater users to make telephone calls through the repeater

○ **Guidelines for Use:**

⊔ Do not use the autopatch when regular phone service is available.

⊔ Never use the autopatch for business communications.

∨ The rules have been relaxed, but …

⊔ Do not use it to avoid a long distance service charge of the telephone company

⊔ Remember you are on the air!

○ **Open Repeater:** A repeater open to all amateurs

⊔ The autopatch may or may not be open to all.
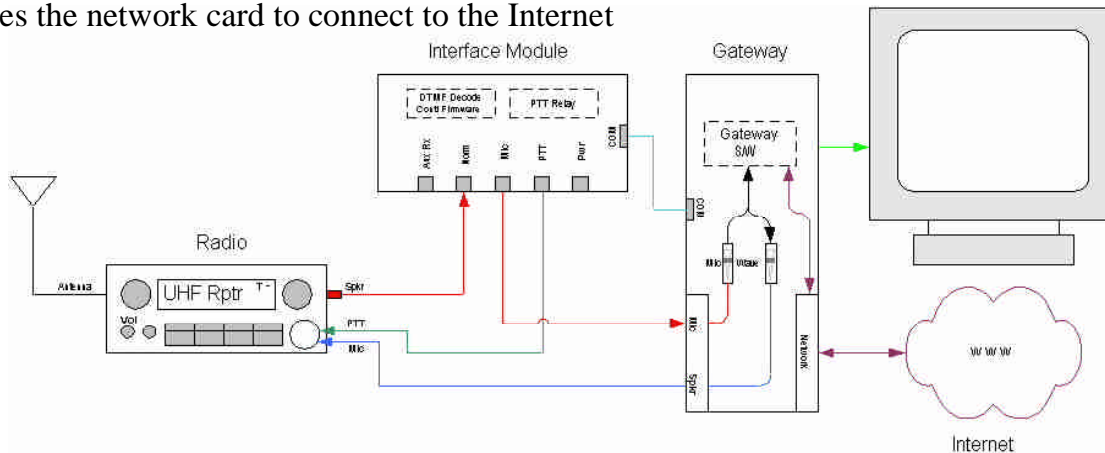
Gateway Communications
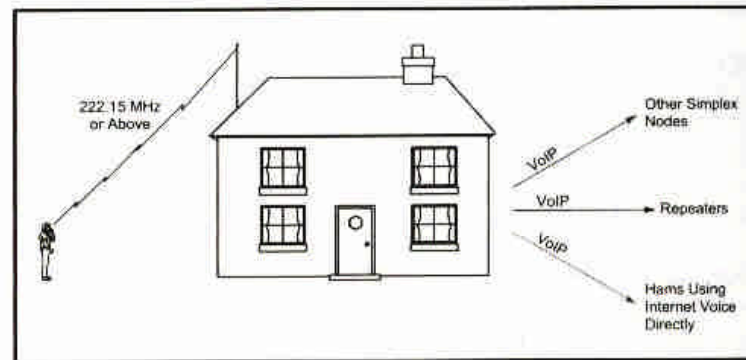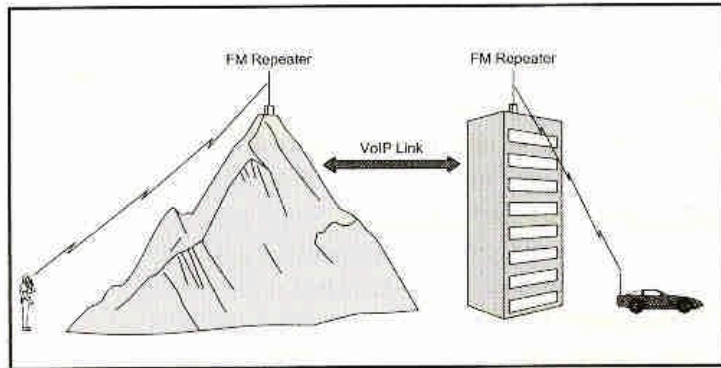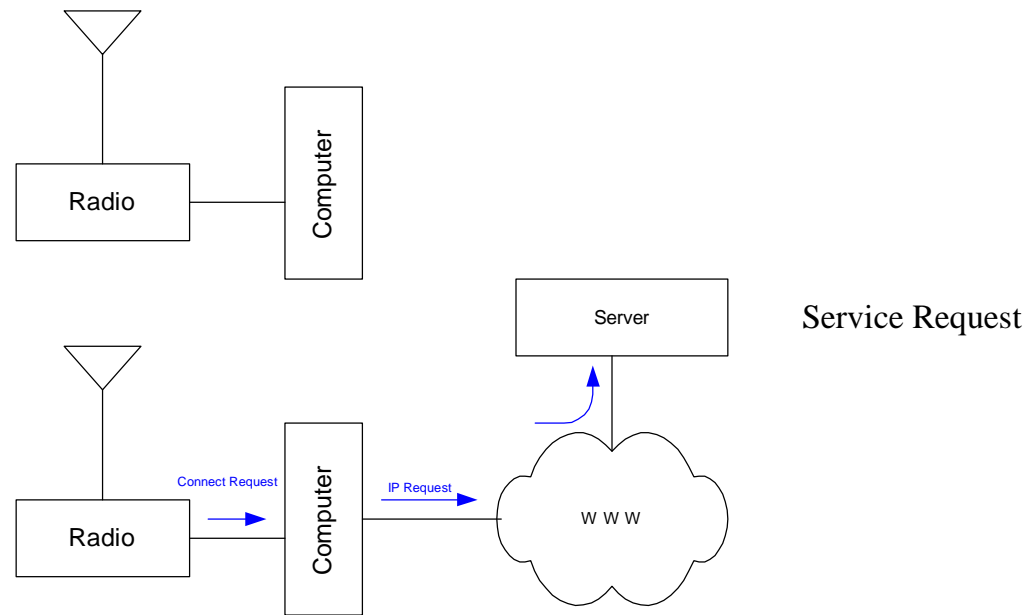
Commutations & Operations

Gateway Basics

q Amateur Radio Communications over the Internet (Note: May not u se 2-Meters as a remote base)
- u Uses Voice over Internet Protocol (VoIP)
- u Two prominent systems
  - ∨ EchoLink: May use a radio or a computer to send voice informat ion over the Internet
  - ∨ Internet Radio Linking Project (IRLP): Communicate over the Int ernet through repeaters
- ∨ Connect to other stations using "Node" numbers

q Gateway is a computer that interfaces between the user and the Internet
- u Uses the sound card to interface to the amateur station
- u Uses the network card to connect to the Internet

Commutations & Operations

Radio — Computer

Radio — Computer → W W W → Server

Connect Request

IP Request

Service Request

Commutations & Operations

Server

Establish a IP pairs table
of both gateways

Radio ↔ Computer — Distance IP Addresses — WWW — Distance IP Addresses — Computer ↔ Radio

No gateway involvement

Radio ↔ Computer — Data packets — WWW — Data Packets — Computer ↔ Radio

Commutations & Operations

Server

Look up IP address in pairs table

Radio — Disconnect Request — Computer — Disconnect Request → W W W — Computer — Radio

Server

Disconnect computers in IP pairs table
Discard table listing

Radio — Computer — Disconnect Link — W W W — Disconnect Link → Computer — Radio

Radio — Computer

Gateway Basics - Continued

q Can not use two meters

   u http://www.access.gpo.gov/nara/cfr/waisidx_00/47cfr97_00.html

   u Part 97.201 Auxiliary station
      v Any station that is remotely controlled via radio must utilize a n auxiliary station
       to execute said control and auxiliary stations are restricted i n frequency.
      v http://www.arrl.org/qst/2003/02/VoIP.pdf

Repeaters in Colorado

Frequency (MHz)	NOTES
145.130 (-) [123.0]	Colorado Springs Repeater to Colorado Connection (Statewide - LINK)
145.160 (-) [107.2]	Colorado Repeater Association - Colorado Springs - Denver 147.225 Repeater
145.265 (-) [100.0]	Pikes Peak FM Association Repeater on UCCS Campus (local)
146.520	National Simplex Calling Frequency - Popular Simplex Frequency
146.625 (-) [123.0]	Colorado Springs Amateur Radio Association Repeater (local)
146.730 (-)	Walsenburg Repeater
146.760 (-) [100.0]	RACES Net Tuesday Evenings at 7:30 PM
146.790 (-)	Peublo Amateur Radio Club - Pueblo Repeater
146.820 (-) [107.2]	Mountain Amateur Radio Club (Teller Co. Primary - Woodland - LINK)
146.835 (-)	Portable Repeater 1
146.865 (-)	Portable Repeater 2
146.880 (-) [88.5]	Deer Peak (Pueblo Repeater) - Good for So. Mountains
146.910 (-) [151.4]	Garden of the Gods Amateur Radio Club Repeater (local)
146.970 (-) [100.0]	Pikes Peak FM Association Repeater
147.015 (+) [107.2]	Mountain Amateur Radio Club (Teller Co. & Cripple Creek - LINK)
147.165 (+) [151.4]	Private Repeater in Colorado Springs
147.030 (+) [107.2]	Private Repeater in Colorado Springs
147.210 (+)	Cañon City Repeater - Good for Arkansas River Canyon
147.345 (+) [100.0]	Cheyenne Mountain Repeater Group Repeater

Source: AMP Connectors

Repeaters in Colorado

Frequency (MHz)	NOTES
446.000	National Simplex Calling Frequency - Popular Simplex Frequency
447.675 (-) [107.2]	Black Forest Amateur Club (local)
448.000 (-) [100.0]	Cheyenne Mountain Repeater Group
448.100 (-) [100.0]	Cheyenne Mountain Repeater Group
448.450 (-) [100.0]	Pikes Peak FM Association Repeater on UCCS Campus (local)
447.025 (-) [123.0]	Colorado Springs Amateur Radio Association Repeater (local)
449.625 (-) [100.0]	Cheyenne Mountain Repeater Group - Pueblo (Deer Peak)

Some Websites

http://www.mtn.org/handiham/	Handi-Hams site serving handicapped operators
http://www.fcc.gov/oet/rfsafety/	FCC Web page outline RF safety issues
http://www.qrz.com/	Lots of neat stuff and amateur call sign look up
http://www.ualr.edu/~hamradio/	Amateur call sign look up table
http://www.qsl.net/	Links to Amateur Radio web pages
http://www.qsl.net/ppraa/	Pikes Peak Radio Amateur Assn home page
http://www.ppfma.org	Pikes Peak FM Association home page
http://www.qsl.net/cmrg/index.html	Cheyenne Mountain Repeater Group home page
http://www.csara.org	Colorado Sprgs Amateur Radio Assn home page
http://www.qsl.net/n7lv/dist14.htm	Pikes Peak District ARES Website for District 14
http://www.qsl.net/~epcraces/	El Paso County RACES Website
http://www.ccarc.net/	Colorado Council of Amateur Radio Clubs
http://www.arrl.org/	Amateur Radio Relay League Website
http://www.amsat.org/	Amateur Radio Satellite Information
http://www.echolink.org	World Wide Communications over the Internet