LONDON AMATEUR RADIO CLUB
2019 Basic License Course
Trinity Lutheran Church

Routine Operation of an

Amateur Station

Chapter 12.1 to 12.5.6

12.1 Introduction

- Q codes
- The Phonetic Alphabet
- Voice Procedures
- Channelized VHF/UHF Operation

12.2 Q codes

- Also known as procedural sign or prosigns
- Universal list of abbreviations to speed up CW transmissions
- Helps operators that may speak a different language
- Adding a “?” changes the meaning QTH vs QTH?
- **Procedural signals, Q-code or abbreviations cannot have a secret meaning** B-001-007-007 Mainly used for CW – digital, but sneak into voice comms

- On exam - easy marks
  - QSB - your signals are fading
  - QRS - send more slowly
  - QR**M**- I'm being interfered with (man made)
  - QR**N**- I am troubled by static (natural)
  - QSY- change to another frequency …
  - QRL- I am busy
  - QRX- I will call you …
  - QRZ- you are being called by …
  - QRU- I have nothing for you
  - QRT- stop sending
  - QSL- I acknowledge receipt
  - QTH- my location is …

12.3 The Phonetic Alphabet

- **To make your call sign understood on voice – use International Phonetics for each letter of your call sign** B-002-002-001
- English may not be your contact's first language or they may not understand your accent.
- Do not use non-standard phonetics
- Emphasis on the syllables is not the normal English form
- Name and location may also have to be spelled

More easy marks:

- A AL FA
- B BRA VO
- D DEL TA
- E ECH O
- G GOLF
- I IN DI A
- L LI MA
- P PA PA
- R RO ME O

Not on test, but good information to know is pronunciation of numerals

- 3 THU-REE
- 4 FOE-WER
- 5 FY-YIV
- 7 SEV-VEN
- 9 NINE-ER
- 0 ZEE-ROW

12.4 Voice Procedure

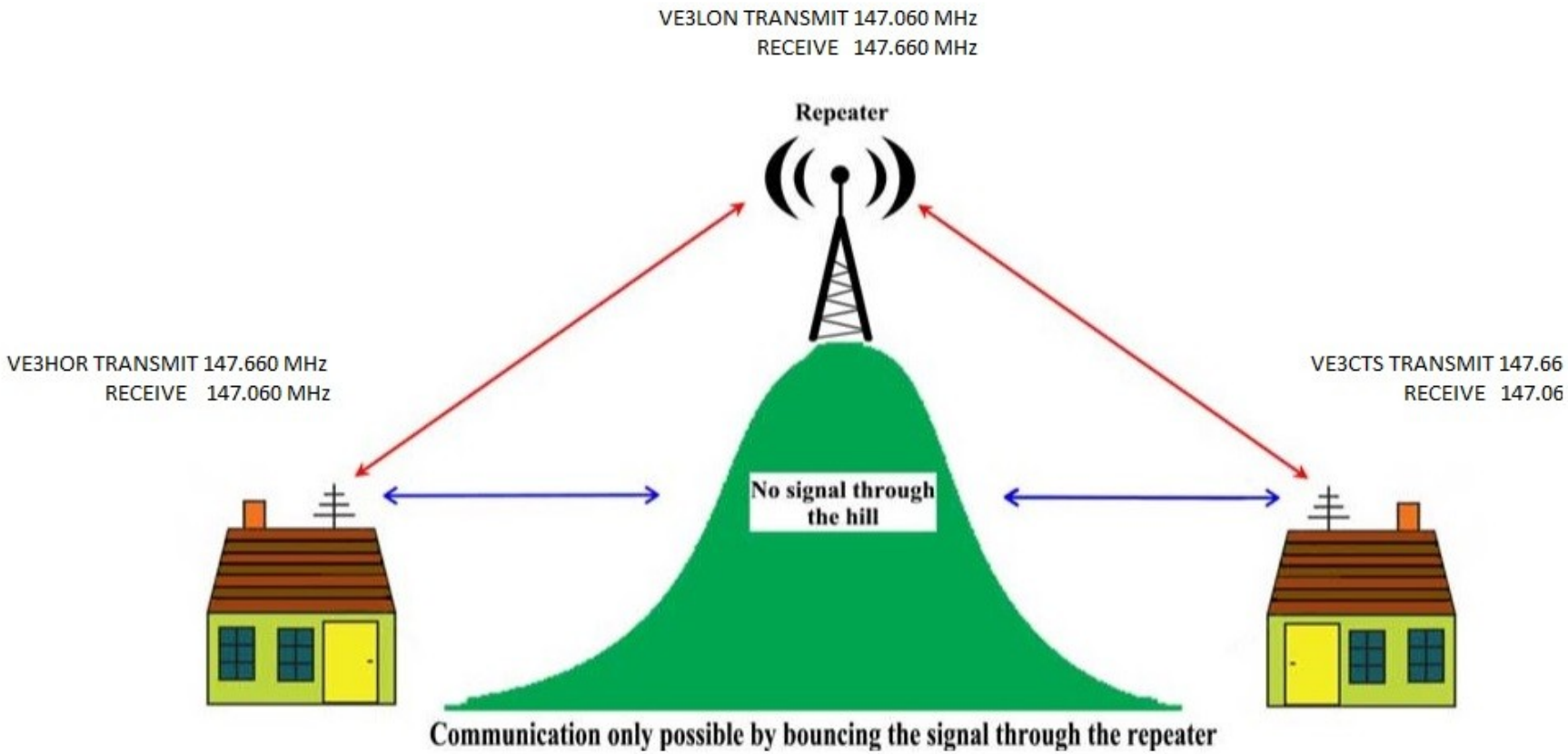
- Prowords are voice versions of the much older prosigns (Q-codes) used with CW
- No questions on the exam pertaining to the prowords
- It is good information to know, especially if you get interested in NTS (National Traffic System) relaying messages throughout Canada/US
- OVER-transmission ended I expect a reply
- OUT-transmission ended no reply expected
- ROGER- received and understood
- WILCO-will comply don’t say Roger Wilco

12.5 Channelized VHF/UHF Operation

- Unlike HF – vhf/uhf has designated frequencies called channels with various spacing (15, 20 & 30 kHz) determined by the area of use
- Bands above - 30 MHz
  - 6 metres - 50 to 54 MHz
  - 2 metres - 144 to 148 MHz
  - **50-148 MHz maximum bandwidth = 30 kHz** B-001-016-001
  - 135 cm - 220 to 225 MHz
  - 70 cm - 430 to 450 MHz
  - 33 cm - 902 to 928 MHz
  - 23 cm - 1240 to 1300 MHz
- **V/UHF is used for local communications to free up HF bands and reduce interference** B-002-003-005

FM (frequency modulation) is the most popular mode, but SSB, AM & CW are available (see band plans)

- 2 metres - 144 to 148 MHz - Amateur Primary Exclusive
- 135 cm - 220 to 225 MHz - Amateur Primary Exclusive 222-225 MHz
- 70 cm - 430 to 450 MHz - -Amateur Secondary
  - **Amateurs must not cause interference …** B-001-010-007
- 33 cm - 902 to 928 MHz - Amateur & Land Mobile Secondary
  - **Amateurs are not protected from interference** B-001-010-008
  - **Which bands occupied by license exempt devices** B-001-010-010
- 13 cm – 2300 to 2450 MHz - Amateur Secondary
  - **What band do amateur share with license exempt medical devices** B-001-010-011


VE3LON TRANSMIT 147.060 MHz
RECEIVE 147.660 MHz
Repeater
VE3HOR TRANSMIT 147.660 MHz
RECEIVE 147.060 MHz
VE3CTS TRANSMIT 147.66
RECEIVE 147.06
No signal through the hill
Communication only possible by bouncing the signal through the repeater

12.5.1. Operating on Repeaters

- **Repeaters increase the range of mobile and low power radios** B-002-001-003
  - Located at a high elevation with a sensitive receiver, high power transmitter and high gain antenna
  - Antennas are vertically polarized – holding your HT horizontal will reduce your signal by more than half
  - **To reduce exposure to RF, hold your HT's antenna away from your head** B-003-021-004
  - **Pause briefly before transmitting to leave time for someone to break in** B-002-001-007
  - **Proper way to joint a conversation is say your call sign** and a short explanation if required – "VE3CTS with info" B-002-001-009
- In an emergency you can break in on any conversation
  - "BREAK -- VE3CTS with emergency / urgent traffic"
  - Even if repeater is quiet go ahead and call there may be someone monitoring

- General repeater operating practices
  - **To operate a repeater on the same band requires Basic and Advanced qualifications** B-001-008-004
  - Use common sense – listen to conversation and don't interrupt unless invited
  - Leave a break for others to call in
  - **Capture effect – when two signals are present on the same frequency, only the strongest will be heard.** B-003-013-011
  - **Always identify yourself – full call sign, at the beginning and end of your contact or at least every 30 minutes** B-001-013-009
  - It's not necessary to identify every time you transmit during a contact
  - Please identify if you 'kerchunk' a repeater or sending DTMFs

Setting transmit and receive offset

- **2 Metres – your transmitter offset is 600 kHz from *repeater's* transmit frequency** B-002-001-011
  - Below 146.999 minus 600 kHz
  - At 147.000 and above add 600 kHz
    - VE3LON repeater transmits on 147.060 MHz and receives on 147.660 MHz
    - You would receive on 147.060 but transmit on 147.660 MHz

- 70 centimetres – your transmitter offset is plus 5 MHz above the repeater’s transmit frequency
  - VE3SUE repeater transmits on 444.400 MHz and receives on 449.400 MHz
  - You would receive on 444.400 MHz but transmit on 449.400 MHz

Tone Squelch - Encode and or Decode

- **CTCSS** – continuous tone coded squelch system
  - **Sub-audible tone activates receiver audio** B-002-001-005
- Used for sharing common frequencies
  - Also known as PL (Private Line – Motorola) or
    CG (Channel Guard – General Electric)
  - 50 sub-audible tones ranging from 67.0 to 254.1 Hz
  - London and area uses 114.8 Hz
    - Repeaters outside of large metropolitan areas don't use "PL" and are listed as "Open"

- ENCODE means you are transmitting the sub-audible tone
- DECODE means your receiver will be activated when a sub-audible tone is received
- It’s not necessary to listen in decode mode – but will block out any *intermodulation* or activity during band openings.

- DCS – digital coded squelch
  - Is similar to CTCSS but uses a binary stream sent sub-audible

12.5.2 **SIMPLEX** OPERATION

- **Transmitting (and receiving) on the same frequency** without the use of a repeater B-002-003-003
  - **If you are on a repeater and want to determine if you can talk to another station using simplex to free up the repeater – listen on the repeater input to see if you can hear him/her** B-002-003-007
  - Most modern radios have a reverse or monitor button that will automatically switch your receiver to the input frequency of the repeater
  - **Choose a simplex frequency taking care not to operate where you may interfere with another repeater or specialized designated frequencies (satellites, cw, moon bounce, digital etc.)** B-002-003-006
  - https://wp.rac.ca/144-mhz-2m-page/

12.5.3 YOUR FIRST CONTACT

- Pick a simplex frequency
- Listen to check if frequency is busy
  - Do not repeat call signs several times
  - Phonetics are not necessary unless stations are unfamiliar with one another or you have letters that may sound similar (eg VE3BEG)
  - **Once contact is made identification only *has to* happen every 30 minutes or at the end of the transmission** B-001-013-009
  - Calling CQ, 10 codes or CB slang are not an acceptable practice on VHF/UHF
  - End your contact with saying your call sign and “CLEAR”

12.5.4 YOUR FIRST REPEATER CONTACT

- Choose repeater you plan to use
  - Set repeater receive frequency
  - Set transmit offset
    - (+/- 600 hHz for two metres or 5 MHz for 70 cm)
  - Set access tone (CTCSS) if required
    - 114.8 for London and area
    - It's okay to send (encode) even if not required
    - If tone squelch (decode) is set, you won't hear anything if repeater isn't sending tone.
- The *repeater* is operating in 'Full Duplex' sending and receiving at the same time.

- 12.5.4 YOUR FIRST REPEATER CONTACT - continued

- Similar to your first simplex contact
  - Listen, then …

- **Call your contact on a repeater**
  - **Say contact's call sign first then "this is" and your call sign B-002-001-001**

- *You* are now operating in 'Half Duplex'
  - You are transmitting and receiving on different frequencies, but not at the same time.

- If a station ask you for a ‘signal report’ he/she wants to know how they are sounding into the repeater – not the S meter reading (that’s the repeater)
  - Full quieting
  - Solid copy
  - Noisy
  - Picket fencing
  - Mobile flutter
  - Bacon frying
- When you’re finished with your contact –
  - Say your call sign and CLEAR
  - or if you’re going to continue listening to the repeater you can say your call sign and MONITORING

- **TIME-OUT TIMERS are programmed into repeaters to limit the time the transmitter will be on without an interruption** B-002-001-004
  - Most may be 4 to 5 minutes
  - When carrier drops timer resets

- SQUELCH TAIL is the short burst of white noise heard on an FM receiver between the time a signal ceases to be received and the squelch circuit actually mutes the audio output
  - Most repeaters have any audio delay board installed to prevent the ‘white noise’ from being transmitted

- COURTESY TONE is a tone, beep or a CW letter that the repeater automatically sends when it stops receiving
  - Helps remind users to wait before they transmit therefore leaving a break for someone to call in
  - It normal for the Timeout Timer to reset after the Courtesy Tone
  - If you don’t wait for the Courtesy Tone – you will not have the full allotment of time before the repeater stops transmitting

- CARRIER DELAY is the ‘dead air’ you hear after a person stops transmitting and the courtesy tone is sent.
  - Can also be known as ‘hang time’
  - Was originally designed to eliminate the repeater’s tube transmitter from chattering on and off when the repeater’s receiver is receiving a noisy choppy signal

- **DESENSE is characteristic of many radio receivers in which a strong RF signal overloads the receiver reducing sensitivity**

  B-008-001-009

- **INTERMODULATION is when two or more strong out-of-band signals mix in your receiver to produce interference on a desired frequency** B-008-001-008

- FREQUENCY DEVIATION is the difference between the FM carrier frequency and when the carrier is being modulated by voice, tone etc.
- **OVER DEVIATING (talking too loud, mic gain turned to high etc) will make your signal too wide to be received and may cause interference.** B-003-013-001

  B-003-013-010

- (FREQUENCY)MODULATION – changes the frequency of the carrier frequency in accordance with the audio input by the microphone
  - **If your microphone fails to work on your FM transmitter – you have an *unmodulated* carrier** B-003-013-004

- **FREQUENCY CO-ORDINATION for VHF & UHF repeaters is a process which seeks to carefully approve frequencies so as to minimize interference with neighbouring repeaters** B-002-001-003

- **SMA CONNECTOR is commonly used to join a handheld transceiver to its antenna** B-006-003-005

12.5.5 AUTOPATCHES

12.5.6 IRLP AND ECHOLINK

No questions on exam for this topic

- VoiP – Voice over internet Protocol
- Is a method for taking analog audio signal (voice) and turning it into digital data that can be sent over the internet

- IRLP – Internet Radio Linking Project
  - Radio → Internet → radio
  - David Cameron VE7LTD

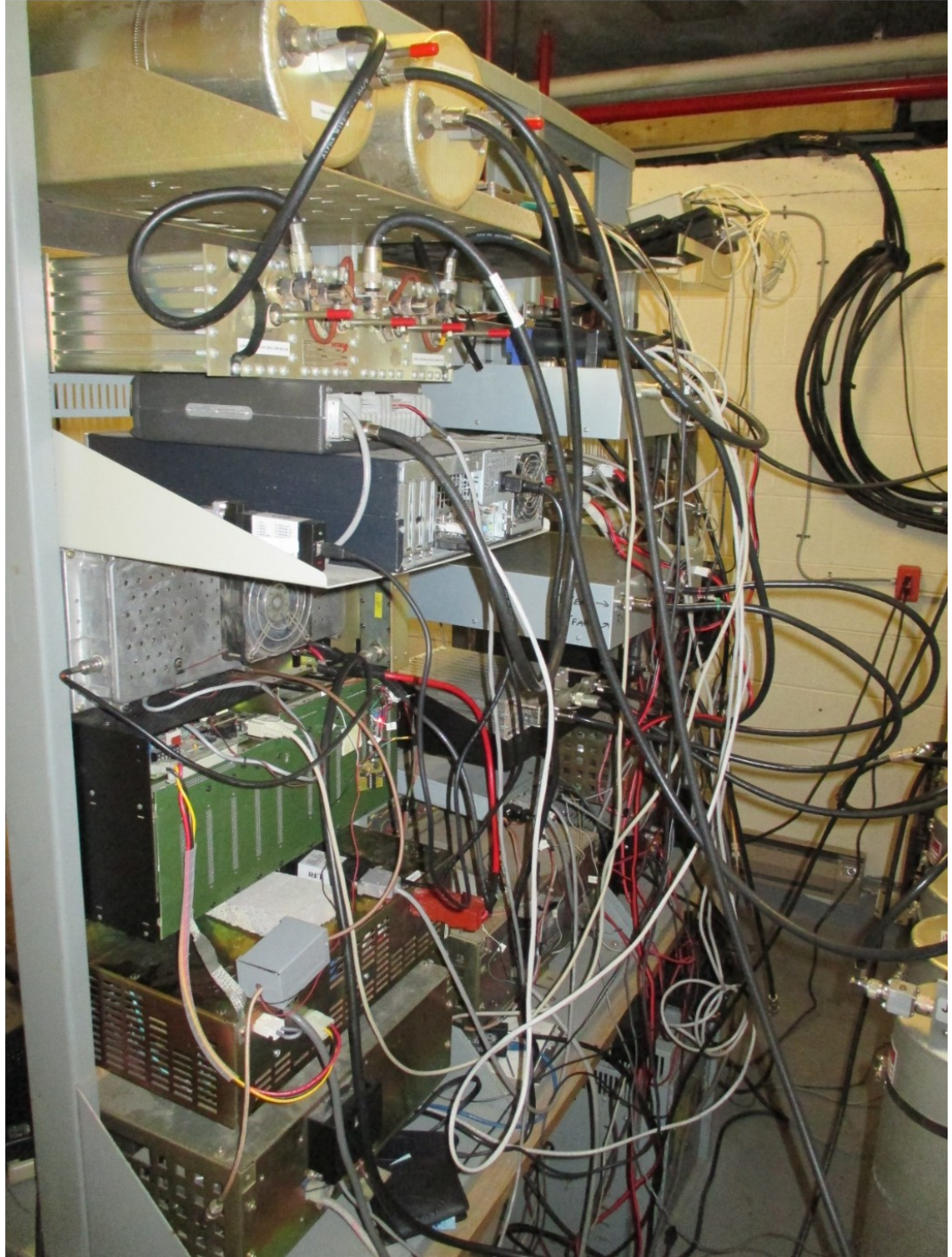
- ECHOLINK
  - Radio / computer → internet → radio / computer
  - Android app available – requires proof of license

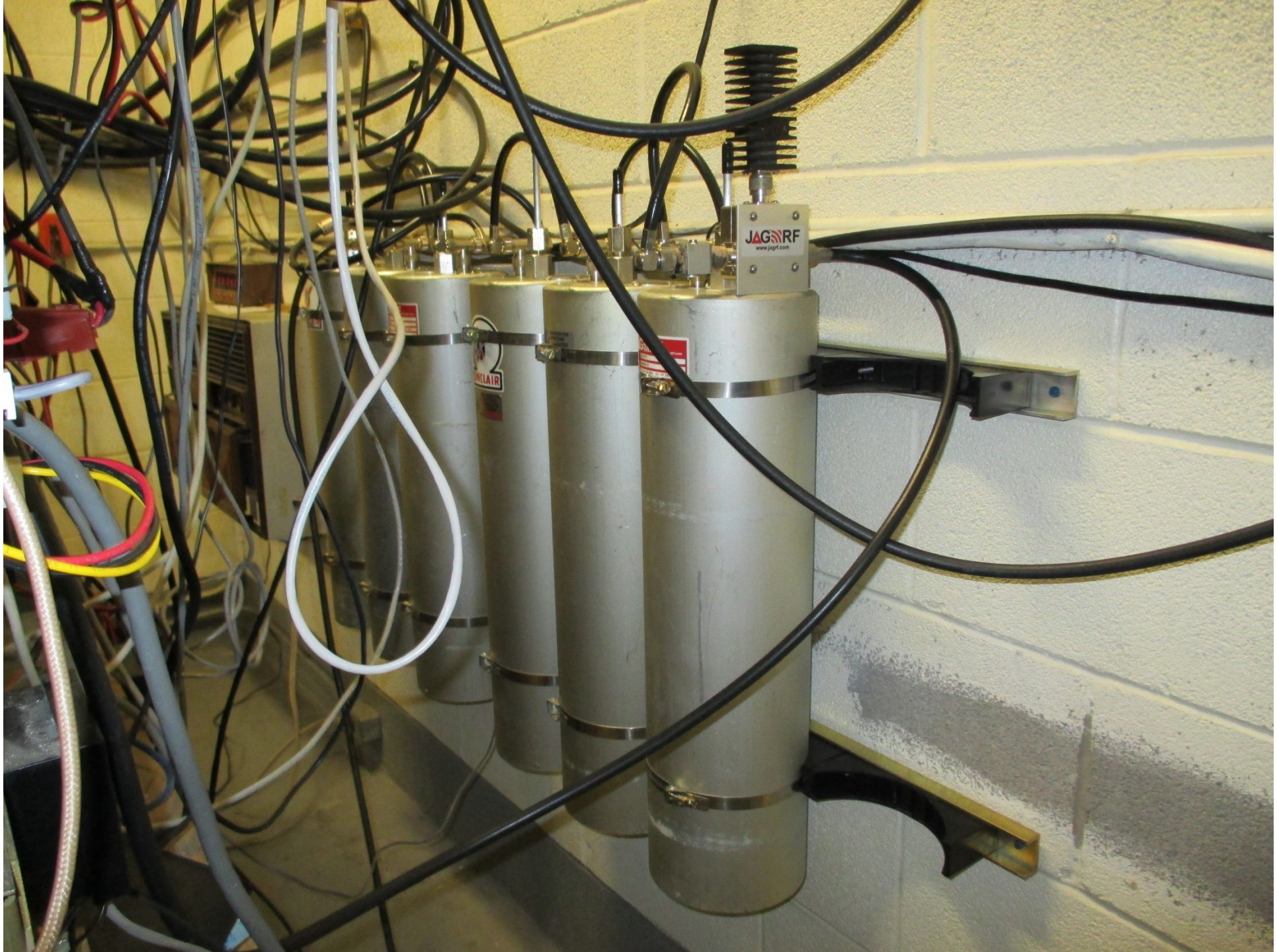
- ALLSTAR LINK
  - Also uses streaming audio technology
  - Controlled by a Linux based computer system (open source) and Asterisk PBX telephone switch
  - Also can control radio – repeater – remote base
  - Can operate with raspberry pi
  - Telephone into the system


Arcom
RC210 REPEATER CONTROLLER
Recom

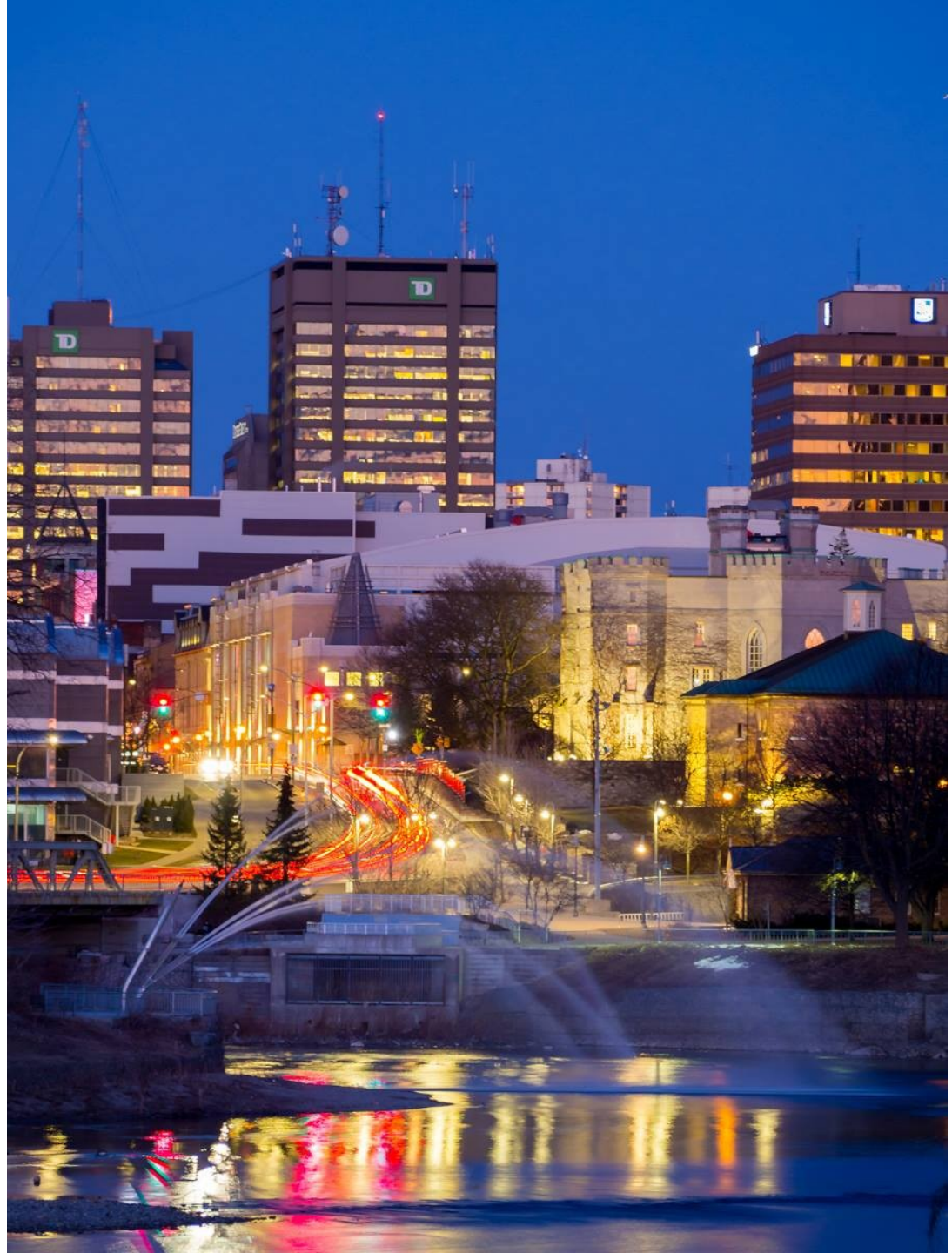

SINCLAIR
MASTR II
D-STAR
D-STAR
D-STAR
LINK COMMUNICATIONS INC. RLC-4 Control System


D-STAR
D-STAR
D-STAR
LC
LINK COMMUNICATIONS INC. RLC-1 Control System




JAGRF
www.jagrf.com


SINCLAIR




That's all Folks!