The Anglican Relief and Development Fund®

Communications in Parish Preparedness

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Radio Communications

The Retevis RT-21 is available from Amazon as an FRS (Family Radio Service) or GMRS (General Mobile Radio Service) which operates in the UHF Radio FM band, as defined by the FCC. UHF Radio operates in the 462-467 MHz and is ideal for line-of-sight, traveling through buildings, walls and concrete blocks with a distance of ½ to 1.5 miles. Metal insulation can interfere with the Radio Signals and make them unusable.

The RT-21 is highly programmable with 16 channels that can be set for any GMRS frequencies; power level from ½ to 2 watts; and is compatible with a multitude of both Analog/Digital coded squelch (my preference) settings. The RT-21 accessories are extra batteries, larger capacity batteries, an over the ear earpiece/microphone or with what I call the Secret Service type coiled tube earpiece with microphone. We bought 10 radios to serve our needs. Everyone had their own personal choice of earpieces.

Our team members asked if we could get bluetooth headsets which were introduced in 2022 as an add-on accessory, but they did not work well since the radio was not designed with features needed for Bluetooth. A 6pk of basic radios with a single six-way charge station (six built into one charging unit) sells on Amazon for just over *$21 each* radio including the six-way charger but without headpieces. You will need someone to set up the radios and to pick a frequency, squelch setting, etc. Most ham radio operators and radio shop techs can do this work, but you will need a programming cable, PC, and to download free software from Retrevis. We used these radios with enormous success from 2019 through 2024. A fully charged radio has a battery life of about 2 days with normal use.

Due to popularity of GMRS, the FCC adopted new rules in 2020/2021 that requires a license to be applied for with the FCC. It is $30 for 10 years. Any business, sight (church, home, family) needs to apply for the license. In return, the FCC will issue an ID and certificate for your group to use. The FCC also increased the transmit power from 2 watts to 50 watts and this includes repeaters (for larger systems) and they assigned designated frequences to designated channels. There are a total of 30 assigned channels.

Retrevis introduced a new RB-89 enhanced radio with 5 watts of power and GMRS the 30 radio channels are preassigned (per FCC) but finally bluetooth was built into the design. The bluetooth receiver/microphone is an over the "earbud" looking device. To transmit, one simply touches the outside of the "earbud" and a heat sensor sets you into transmit mode. The "earbud" receives any traffic on that particular channel.

The radio and earbud are a matched pair because the bluetooth is unique to each radio. The new radios work a little differently and the bluetooth pairing process has to be done at each power-up sequence, but it's mostly automatic. With our having 24 radios assigned to each team member, we find that several team members will wear a radio (on their belt) and earbud every Sunday, which makes our teams more effective with 15 radios live on one of our recent services. This has enhanced our safety! Amazon sells the new radios in packs of 4, 6 or 8 pairs (each pair is a radio and BT

earbud). Pricing is between $40ea & $60ea (1 radio/1 BT earbud) depending on the quantity bought. Battery life is in excess of 2 days while in normal use.

CCTV (Closed Circuit Television)

Our campus at St Timothy's Anglican Cathedral is spread out across several acres of land. We identified the need for 32 cameras and an NVR (network video recorder). This is an all-digital system. At the time, 4k cameras were widely available with a cost within reason. A 4k camera has pixel definition of 3,840 wide x 2,160 high (most HD TV's are 1920x1080), so in effect the 4k camera is 4x the resolution of an HDTV. We really need this definition to read license plates, to be able to distinguish facial features, etc. 8k cameras are now available, but the extra cost of the NVR and disk space are unreasonable.

Most NVRs are limited to 32 channels of 4k video, due to the practical bandwidth of the compute power and monitor limitations. Amazon once again was where we shopped. Amazon was the exclusive sales channel for "Armcrest" equipment, which is a Houston, TX based company for electronic design, software engineering with part manufacturing being done in China. The company is a leader in technology and products.

In examining the entire campus with the desired cameras and field-of-view penciled in, we determined that there were 3 zones of cameras, meaning that we could concentrate the cameras in 3 areas of the property where we would locate the 3 switches for all of the cameras to connect. Each switch is a "POE" (power over Ethernet) switch meaning that the cameras are powered by the switches. This has to be carefully engineered into the switch selection. One switch should be designated as the "main switch" (which has cameras, the NVR feed line and two trunk lines going to the two secondary switches where more cameras are connected. This configuration is designated as a "cascade configuration."

There are several pieces of gear that need to be purchased:

1. NVR – 32 channels with a large array of specialized NVR compatible Hard Drives (made to run continuously). In our case, we have two 12 TB drives cascaded (by the NVR) to give us 24 TB of storage. This gives about 10 days of storage for 32 cameras. Our NVR system has software that can be setup to trigger upon any movement seen individually by each camera. This allows us to only record the movements during the week, but on Saturday and Sunday we record continuously.
2. A number of 4k indoor turret style cameras and a number of 4k outdoor weatherproof cameras. All cameras are connected via 1 gigabit POE at each switch port. One port per camera!
3. UPS system (for backup power and filtering). 1kva is sufficient.
4. For Monitoring in our CCTV room, we needed a super spec Digital TV monitor with high end specs of 4k video @ 120 Hz. We installed a special 60" TV made by Samsung. Again, it has to be 4k@120 Hz.
5. Due to our large campus, we installed a new isolated video network complete with new gigabit wiring using CAT6e wire. Keep in mind that the max distance between any gigabit device to another gigabit device is 300' maximum. For longer distances, Fiber has to be used. Fiber is quite costly and has to be installed by a professional.
6. 3 each gigabit 16 port POE switches. These are high spec switches to handle the POE power and heavy traffic.

7. To monitor remotely, your ISP needs to provide you with an external IP address so that authorized users can access the system. At least 500kbps bidirectional (SDSL) is best.

The system has been able to provide 32 sets of eyes around the campus. We normally have a dispatcher designated for each service to notify our safety people if anything looks suspicious. It also provides video export for documenting accidents and can give the police a thumb-drive of evidence. Our church office asked to have an extension of the system in their office which was accomplished with a 4k@120 Hz video switch, a 4k@120 Hz HDbaseT video extender with CAT6e Shielded cable for a distance of 50' and a second 4k@120 Hz TV monitor that is mounted on the wall.

Wiring for the cameras and trunk lines is by far the most time consuming and costly item to install. A complete system like this (including labor to install) cost about $25k back in 2021. With inflation, this number is bound to be much higher. Do not skimp on this type of system because there's a bunch of reasons to go first class. Analog systems should be avoided.

If I may answer any questions, please reach out to me at **guy@guyw.us**.

Give God all the glory.

Guy Williams