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PA-STARNet Interoperability

Standard Operating Procedures

pennsylvania
STATEWIDE RADIO NETWORK

PA-STARNET

Appendix C

Appendix C — Using the UHF Overlay

By overlaying the commonwealth's 800 MHz system with a network of UHF repeaters and mapping each repeater to an OpenSky talk group, the state allows users of UHF radio systems to communicate directly with state agencies.

Typically at selected radio tower sites, two UHF repeaters are installed and mapped to OpenSky talk groups. Taking full advantage of this capability requires knowing all of the following:

- The location in which use of the overlay is to occur
- The coverage footprint of the tower site for that location
- The frequency and tone information for the tower site

This information appears in Table 1 below and in the UHF overlay coverage maps.

For example, suppose a local responder with a UHF radio is assigned to an event at the State Farm Show Building that requires communication with state agencies. The first step is to determine if an overlay site is available with coverage at the Farm Show Building. The coverage footprint maps show that the DAUP17 site should provide the required coverage.

The next step is to program the UHF radio to operate with the repeaters installed at DAUP17. The chart below shows that *UTAC41* is available at DAUP17 as well as at nearly every UHF overlay site in the state. *UTAC42* is the second repeater available at DAUP17. It is important to ensure that these channels are programmed for narrowband operation.

Each repeater in the state encodes a Continuous Tone-Coded Squelch System (CTCSS) tone of 156.7 and nothing else. Each repeater decodes 156.7 and a second tone specified in the chart. It is preferable to use the secondary repeater decode tone specified rather than 156.7 to prevent hitting multiple repeaters in areas of overlapping coverage.

In the Farm Show Building example, following is the programming for the UHF radio that results from the steps above:

Alias	Transmit Freq/Tone	Receive Freq/Tone
UTAC41	458.4625 / 118.8	453.4625 / 156.7
UTAC42	458.7125 / 146.2	453.7125 / 156.7

The final step in ensuring the ability to communicate with state agencies when using the UHF radio is to make sure those agencies have the talk groups corresponding to the selected UHF channels available in their OpenSky radios. In this case, the appropriate talk groups are *41_DA17* and *42_DA17*.

The talk group naming convention uses *41, 42,* or *43* according to whether *UTAC41, UTAC42,* or *UTAC43* is used. *DA17* refers to the tower site location. For instance, the name *41_DA17* means that the corresponding UHF channel is *UTAC41* located at the DAUP17 site.

SRND recommends that local agencies program the overlay channels in their areas of operation into their radios in advance. Agencies might consider doing this when purchasing new radios or when reprogramming radios.

UHF Overlay Coverage and Connectivity
The document *PA-STARNet UHF overlay coverage maps* (PDF, 2.8 MB) shows coverage footprint maps for each serving site to plan communications support using the UHF overlay. Table 1 below shows key information for each site. Note that UHF repeaters are narrowband operating at 12.5 KHz. Mobile's transmit is + 5MHz. All repeaters encode 156.7 only.

Table 1 — UHF Overlay Site Inventory

Site Code	Latitude	Longitude	Call Sign	UTAC41 $f=453.4625$	UTAC41 CTCSS Decode	UTAC42 $f=453.7125$	UTAC43 $f=453.8625$	2nd Station CTCSS Decode
ARMS01	40.90863	-79.44474	WQJF541	X	79.7	X		94.8
BEAV02	40.49644	-80.42033	WQIE490	X	110.9		X	127.3
BEDF02	39.82994	-78.54350	WQIE496	X	97.4	X		103.5
BERK02	40.20147	-75.81297	WQIE497	X	136.5		X	179.9
BERK04	40.60425	-75.99133	WQIE494	X	97.4	X		103.5
BLAI02	40.29300	-78.26056	WQIE496	X	91.5		X	85.4
BRAD41	41.65285	-76.41092	WQIE491	X	167.9		X	79.7
BUCK40	40.44622	-75.25100	WQIE497	X	118.8	X		146.2
BUTL01	41.08989	-79.85386	WQJF541	X	97.4		X	103.5
CAMB02	40.37078	-78.98308	WQIE490	X	127.3		X	136.5
CAME05	41.45922	-78.36794	WQIE495	X	74.4		X	85.4
CENT04	40.73200	-78.32531	WQIE496	X	136.5	X		179.9
CENT08	40.75311	-77.75569	WQIE496	X	203.5		X	74.4
CLIN02	41.39742	-77.85431	WQIE491	X	146.2	X		167.9
CLIN41	41.05084	-77.37940	WQIE494	X	186.2	X		77
COLU01	40.93925	-76.42439	WQIE494	X	179.9		X	203.5
COLU02	41.14703	-76.59773	WQIE494	X	203.5		X	74.4
CRAW01	41.66745	-79.83914	WQJF541	X	127.3		X	136.5
CUMB04	39.98869	-77.40428	WQIE500	X	146.2	X		167.9
DAUP01	40.42036	-76.81219	WQIE500	X	186.2		X	77
DAUP17	40.28717	-76.87858	WQIE500	X	118.8	X		146.2
ELKC04	41.27533	-78.41447	WQIE491	X	110.9	X		127.3
ERIE92	41.88267	-80.19007	WQJF541	X	85.4			91.5
FAYE01	39.78258	-79.70172	WQIE490	X	85.4		X	91.5
FORE07	41.46506	-79.28307	WQIE495	X	167.9	X		79.7
FULT40	39.94869	-77.93694	WQIE496	X	74.4		X	85.4
GREE08	39.79800	-80.38133	WQIE490	X	103.5		X	110.9
HUNT01	40.49668	-78.13165	WQIE496	X	167.9	X		79.7
INDI01	40.66728	-78.99683	WQIE490	X	186.2		X	77
JEFF02	41.31728	-78.99476	WQIE495	X	179.9		X	203.5
JUNI05	40.47696	-77.38662	WQIE500	X	118.8	X		146.2
LAWR06	40.91173	-80.19673	WQJF541	X	91.5		X	85.4
LUZE04	41.15870	-76.16910	WQIE493	X	110.9	X		127.3
LYCO02	41.31056	-77.34606	WQIE491	X	79.7		X	94.8
MCKE01	41.80894	-78.36850	WQIE495	X	118.8	X		146.2
MERC92	41.39353	-80.17186	WQJF541	X	118.8	X		146.2
MONR03	41.16398	-75.31824	WQIE493	X	79.7	X		94.8
MONT01	40.95981	-76.70829	WQIE494	X	91.5	X		85.4
PERR01	40.35800	-77.54792	*Pending*	X	79.7			94.8
PHIL02	39.99706	-75.21739	WQIE497	X	85.4	X		91.5
PIKE01	41.29981	-75.12462	WQIE493	X	127.3		X	136.5
POTT12	41.75978	-77.87611	WQIE495	X	97.4		X	103.5
SNYD02	40.72244	-77.12136	WQIE494	X	127.3		X	136.5
SOME06	39.80611	-79.17306	WQIE490	X	118.8		X	146.2
SULL03	41.52036	-76.73107	WQIE491	X	85.4	X		91.5
SUSQ06	41.90633	-75.69367	WQIE493	X	91.5	X		85.4
TIOG06	41.84758	-77.15636	WQIE491	X	136.5	X		179.9
WARR34	41.83287	-79.00101	WQIE495	X	103.5	X		110.9
WAYN31	41.57231	-75.19156	WQIE493	X	186.2		X	77
WAYN33	41.78564	-75.45908	WQIE493	X	146.2		X	167.9
YORK16	40.07550	-76.80483	WQIE500	X	103.5	X		110.9
YORK94	39.75483	-76.66238	WQIE500	X	110.9		X	127.3