

Nova Scotia Public Safety Radio Communications User Guide

March 2020



Contents

Introduction.....	3
General Communications Principles.....	4
Acronyms and Definitions.....	4
Communication Mission	4
Radio Communication Procedures	4
General	4
Principles of Radio Communication	4
Prowords.....	5
Passing a Message	5
Phonetic Alphabet	6
Difficult Words	7
Numerals	7
Numbers	8
Abbreviations in Text	8
Call Signs.....	9
All-Station Calls	9
Urgency Signals	10
Imposition of Silence	10
Cancellation of Distress.....	11
Operating Rules	11
General	11
Establishing Communication	12
Sequence of Call Signs	12
Communication Networks	13
General	13
Establishing Networks	14
Directing a Change in Radio Talkgroup/ Channel/Frequency	14
Break-In Procedures.....	15
Radio Checks, Signal Strength and Readability.....	15
Closing Down	16

General Considerations	16
Periodic Equipment Checks	16
Proper Talkgroup/Channel	17
Fleetmap/Channel Reference.....	17
General Safety.....	17
Nova Scotia TMR2	17
Overview.....	17
TMR2 Tower Sites	19
Site Numbers and Names	19
Mutual Aid Talkgroups.....	22
Shared Simplex Channels	23
Radio/System Tones	24
Radio – LED Lights.	25
How to Transmit and Receive on a TMR	25
TMR Agencies	26
Potential Problems with Systems and Equipment.....	27
Site Trunking	27
Failsoft	27
Batteries	28
Common Types of Radio Batteries	28
Installing and Removing the Battery on most TMR units	31
Radio Repair Procedure.....	31
Mobile Communications Support	31
Interesting Links	32
General	32
Appendix B: Communications Log ICS 309.....	34
Appendix C: Incident Communications Form ICS 205	34
Appendix D: Table of Acronyms and Terms	35
Appendix E: Procedural Words (Prowords)	37
or Phrases and their Meanings	37
Appendix F: Site Trunking.....	39

Introduction

Communications has almost always been cited in post-incident debriefings as the weak link in the response efforts; this Guide is designed to provide general direction for successful emergency communications by public service organizations to fulfill the ever-important telecommunication needs of emergency response.

The development of this document started several years ago in Nova Scotia with a group of interested and dedicated stakeholders who produced it in response to a recognized need. The base document has been revised and updated to reflect the adoption by the Province of Nova Scotia of the Incident Command System (ICS) as the standard incident management model.

The procedures described in this Guide have been refined for over 50 years by professionals in radio communication. The Industry Canada (IC) Radio Communication Information Circular 22 has been referenced where applicable, including the International Phonetic Alphabet.

Holding a radio operator license does not make one a radio operator. The skills required are learned by listening, practicing and adhering to procedures, and honed by experience under all operating conditions. A good operator sounds good, knows how to operate correctly, and does so consistently. A poor operator, through lack of knowledge or attention, can disrupt communications with the misuse of procedures and prowords, and poor radio discipline.

This Nova Scotia Public Safety Radio Communications Guide has been prepared for radio users throughout the public safety/public service communications community. The Guide establishes provincial protocols for radio communications and provides a reference for operators in radio communication procedures based on nationally and internationally accepted best practices.

In preparing for emergency communications, the radio communications planner must consider all the available and applicable communications resources (IE. land-line phones, cellular phones, satellite phones, the various radio platforms, email and social media) and use these as appropriate.

The interoperability required for the typical multi-agency response to larger incidents demands that the use of acronyms, abbreviations and

codes is discouraged while involved in these responses; instead plain language is strongly encouraged.

General Communications Principles

Acronyms and Definitions

Every industry and organization have its own acronyms and terms that become part of the culture of that organization. Because most emergencies and all disasters will require multi-agency responses, it is essential that personnel use plain language rather than agency specific acronyms, terms or codes. For information only, some of the more common acronyms and terms and their definitions are listed in Appendix D.

Communication Mission

The mission of the telecommunicator, whether in the field or in a fixed facility, is to:

- A. Receive incoming communications from other response agencies, process the information, and provide an appropriate response.
- B. Monitor the appropriate channels, talkgroups, or networks to ensure that no pertinent communication is missed.
- C. Maintain accurate and timely record of the communications being passed.

Radio Communication Procedures

General

In the interests of efficiency, communication by radio shall be as short and concise as possible, while ensuring accuracy and thoroughness. Adherence to prescribed procedure is essential. Unauthorized departures from, or variations in, prescribed procedure creates confusion, and reduces reliability and speed. If the procedures prescribed herein do not cover a specific operating requirement, initiative and common sense must be applied.

Principles of Radio Communication

The following general principles are essential to radio communications:

Accuracy: It is vital that radio communications be relayed with the utmost accuracy. Omissions or incorrect information can cause inconvenience at best and can be tragic at worst.

Conciseness: Eliminate unnecessary or redundant information. If radio communicators take time to compose their thoughts before transmitting, they will eliminate unnecessary and lengthy transmissions.

Promptness: Timeliness and efficiency are important characteristics of radio communications. Important messages, even if concise and accurately relayed, are of no use if delivered too late.

Speed: Keep the rate of speech constant, neither too fast nor too slow. Remember that the operator receiving your message may have to write it down.

Rhythm: Preserve the rhythm of ordinary conversation. Avoid the introduction of unnecessary sounds such as ‘err’ and ‘um’ between words.

Prowords

Prowords are pronounceable words or phrases, which have been assigned specific meanings for the purpose of expediting communications via radio.

The prowords authorized by Industry Canada for general use are found in Appendix E.

Passing a Message

NOTE: examples of words intended to be spoken will be bold and enclosed in quotes. Prowords will be all upper case.

Messages will be passed in the following order:

1. the call-sign of the station being called: '**Nova Scotia PCC**'
2. the proword '**THIS IS**'
3. the call-sign of the sending station (your call-sign)
‘Crash Site Commander’
4. the proword '**OVER**'

After receiving acknowledgement from the called party that they are ready to listen, the message is spoken completely in a clear voice.

The receiving party will get any required repetitions, then acknowledge the information with '**ROGER, OVER**' or '**ROGER, OUT**'

Phonetic Alphabet

When necessary to identify any letter of the alphabet, the standard phonetic alphabet shall be used as listed below:

Letter	Word	Pronunciation	Letter	Word	Pronunciation
A	ALPHA	al-fah	N	NOVEMBER	no-vem-ber
B	BRAVO	brah-vo	O	OSCAR	oss-car
C	CHARLIE	char-lee	P	PAPA	pah-pah
D	DELTA	dell-tah	Q	QUEBEC	kay-beck
E	ECHO	eck-oh	R	ROMEO	row-me-oh
F	FOXTROT	foks-trot	S	SIERRA	see-air-ra
G	GOLF	Golf	T	TANGO	tang-go
H	HOTEL	ho-tell	U	UNIFORM	you-nee-form
I	INDIA	in-dee-ah	V	VICTOR	vik-tar
J	JULIET	jew-lee-ett	W	WHISKEY	wiss-key
K	KILO	key-loh	X	X-RAY	ecks-ray
L	LIMA	lee-mah	Y	YANKEE	yang-key
M	MIKE	mike	Z	ZULU	zoo-loo

NOTE: The first syllable is generally accented to indicate the letter represented.

Difficult Words

Difficult words within the text of a message may be spelled using the phonetic alphabet and preceded by the proword, '**I SPELL**'. If the operator can pronounce the word to be spelled, s/he will do so before and after the spelling to identify the word.

Example: '**Trivia — I SPELL, Tango Romeo India Victor India Alpha Trivia**'

Numerals

To distinguish numerals from similarly pronounced words, the proword '**FIGURES**' may be used preceding numbers. When transmitted by radio, the following rules for their pronunciation will be observed if the communication is not clear:

Numeral	Spoken As
0	ZE-RO
1	WUN
2	TWO
3	THREE
4	FOW-ER
5	FIFE
6	SIX
7	SEV-EN
8	AIT
9	NIN-ER

Example: '**I SAY FIGURES Fife Sev-en Wun FIGURES**'

Note: When signals are strong there is no objection to pronouncing numerals in the regular way (IE. 'Three, Five, Nine')

Numbers

Numbers will be transmitted digit by digit except that exact multiples of thousands may be spoken as such.

format

Numeral	Spoken As	
44	FOW-ER	FOW-ER
90	NIN-ER	ZE-RO
7000	SEV-EN	THOUSAND
5318	FIFE	THREE WUN AIT

The decimal point is to be spoken as DE-SEE-MAL.

Example: 987.6 is to be spoken as '**Nin-er Ait Sev-en De-see-mal Six'**

Dates will be spoken digit by digit, with the months in full.

Example: 20 August is spoken as '**Two Ze-ro August**'

Roman numerals shall be spoken as the corresponding Arabic letters preceded by the prowords ROMAN NUMERAL.

Example: XX in Roman numerals would be spoken as
'ROMAN NUMERALS X-ray X-ray'

Abbreviations in Text

Initials used alone or in conjunction with short titles shall be spoken phonetically.

Example: Paragraph A is spoken as '**PARAGRAPH Alpha**'

Personal initials shall be spoken phonetically, prefixed by the proword **INITIALS**.

Example: G.H. Smith is spoken as '**INITIALS Golf Hotel Smith**'

Abbreviations frequently used in normal speech may be used in the same manner when transmitted by voice.

Examples: NATO may be spoken as '**NATO**'; REMO may be spoken as '**REMO**'

Call Signs

Use of regular radio Call Signs is mandatory at the beginning and end of a radio conversation. With the clear voice quality typical of today's radio systems, intermediate transmissions need not have the Call Signs used as this simply adds unnecessary radio traffic to the system.

For ease of communication in emergency situations, tactical call signs may be assigned on multi-agency radio networks. The tactical call signs will describe the radio operator's location or function.

Example: The Incident Commander at a Dartmouth General Hospital incident might use the call sign '**Dartmouth General Incident Commander**'.

Tactical Call Signs may have to change during a response if the selected Call Signs conflict.

All-Station Calls

When a radio message is to be broadcast to all field radio units that are likely to be monitoring a particular channel or talkgroup, rather than beginning by stating the call sign, the caller will begin the call by addressing '**All Stations**' and then stating their call sign.

Example: A dispatcher with an urgent message for all parties involved in a forest fire situation states '**All Stations, All Stations, All Stations....this is (your call sign). Please stand-by for (state type of message to follow).**'

Urgency Signals

Although it is unlikely that urgency signals will be heard on public safety radio frequencies or talkgroups, it is possible that a radio operator in an EOC may be directed to operate Marine or Aeronautical Radios or that one of these radios could be linked to another radio system via the PSFC Mobile Communications Support (MCS) units. In these circumstances it is important that the radio operators be familiar with the following three urgency signals that may be heard and that take precedence over all other traffic.

MAYDAY: This signal, referred to as the International Distress Signal, indicates that a station is threatened by grave and imminent danger to life and property, and requires immediate assistance. The word ‘**MAYDAY**’ will be transmitted three times. After the distress signal is sent all traffic will cease and all stations will monitor. Any station in a position to render assistance will do so and all other stations will continue to monitor until the situation is rectified and the frequency is released for normal use.

PAN PAN: This signal, referred to as the International Urgency Signal, indicates the calling station has a very urgent message concerning the safety of a ship, aircraft or other vehicle and/or the safety of a person or persons. The phrase ‘**PAN PAN**’ is transmitted three times. All traffic will cease, and all stations will monitor until the situation is rectified and the frequency is released for normal use.

SECURITÉ: This signal, referred to as the International Safety Signal, indicates that a station is going to transmit a message concerning the safety of navigation or send important meteorological warnings that will, or could, affect ships, aircraft or persons. The word ‘**SECURITÉ**’ (pronounced SAY CUR EE TAY) will be sent three times. All other traffic will cease. All stations will monitor until the frequency is clear.

Imposition of Silence

The station in distress, or the station in control of distress traffic, may impose silence on all stations in the area or on any station that interferes with the distress traffic. It shall address these instructions to “all stations”, or to one station only as appropriate.

The station in distress, or the station in control, shall use the expression “SEELONCE MAYDAY”.

If it is believed to be essential, other stations near the station in distress may also impose silence during a distress situation by using the international expression “SEELONCE DISTRESS”.

Should radio silence be imposed during a distress situation, all transmissions shall cease immediately except for those stations involved in distress traffic.

Cancellation of Distress

When a station is no longer in distress, or when it is no longer necessary to observe radio silence (i.e. the rescue operation has concluded), the station that controlled the distress traffic shall transmit a message addressed to “ALL STATIONS” on the distress frequency(ies) used, advising that normal operation may resume. The proper procedure for cancelling a distress message is:

1. the distress signal “MAYDAY” (once);
2. the words “ALL STATIONS” (three times);
3. the words “THIS IS”;
4. the name or call sign of the station transmitting the message.
5. The filing time of the message;
6. the call sign of the station in distress (once);
7. once the words “SEELONCE FEENEE”.

Operating Rules

General

Transmissions by radio shall be as short and concise as possible without sacrificing accuracy. Transmissions should be clear, with natural emphasis on each word except for the prescribed pronunciation of numerals. If applicable, operators must speak slowly enough that the message can be written by the receiving party.

To avoid interfering with other traffic, operators shall listen for a few seconds to make sure that a channel is clear prior to making any transmission on it.

When it is necessary to initiate test signals for the adjustment of a transmitter or receiver, such signals shall not continue for more than 10 seconds. They shall be composed of the word ‘TEST’ followed by spoken numerals (1, 2, 3 etc.) and the call sign of the station conducting the test.

Establishing Communication

Before passing radio traffic it is necessary to establish communication between the stations involved.

Example A. (Good conditions)

Ambulance 231 transmits: '*Colchester Regional Hospital — this is Medic 231, over.*'

Colchester Hospital answers: '*Medic 231 — this is Colchester Regional Hospital, go ahead.*'

Medic 231 then transmits its message concluding with: '— over'.

Colchester Hospital replies '*Roger, Colchester Regional Hospital out.*'

Example B. (Poor conditions)

Cumberland ECC transmits: '*Shubie Radio, Shubie Radio, Shubie Radio, this is ECC Cumberland, ECC Cumberland, ECC Cumberland for a radio check, over.*'

Shubie Radio answers: '*ECC Cumberland, this is Shubie Radio — your signal is weak but readable, over.*'

ECC Cumberland transmits the message for Shubie Radio, slower than normal with a very careful, clear voice concluding with '— Over'

Shubie Radio replies '*Roger, Shubie Radio out.*'

Sequence of Call Signs

When more than one station is called in one transmission, they shall respond in the same order in which they were called. This should normally be in alphabetical order. If one station fails to answer in its turn, the next in turn answers after a 5-second pause. The station that was missed then answers last, if able to do so.

Example:

EHS Communications transmits: '*Colchester Regional Hospital — Cumberland Regional Hospital, Dartmouth General, this is EHS Communications; over.*'

Colchester Regional Hospital Answers: '*EHS Communications — this is Colchester Regional Hospital; over*'

Not hearing Cumberland Regional Hospital, Dartmouth General, waits for 5 seconds and answers: '*EHS Communications, this is Dartmouth General; over.*'

Ambulance Communications then responds with: ‘*Colchester Regional Hospital, Dartmouth General — Roger; Cumberland Regional Hospital, nothing heard*’ then delivers the intended message.

Communication Networks

General

A radio communication network is a group of two or more radio users operating on the same frequency(ies) or talkgroups for the purpose of communicating information of mutual interest. In the emergency incident context, networks are used to pass information and instructions relating to the emergency situation, request assistance and support, and coordinate response efforts.

A communication network can also be established using landline telephones or a combination of this with wireless technologies such as two-way radio, cellular phones and satellite phones.

Minor incidents may need only a single channel or talkgroup, while larger scale events may need to use multiple talkgroups, repeater(s), and the interoperability and range offered by the Trunked Mobile Radio System (TMRS). The decision as to which network(s) will be used is made by the Incident Commander or the designated Communication Unit Leader. The important point is that management of communication networks must be applied early in the incident response stage or it will be very difficult to manage it at a later point.

As a general rule, emergency responders will use the Trunked Mobile Radio System (TMR2) for their communications. Within this Network the Incident Commander, Communications Unit Leader, or Dispatch will designate specific channels/ talkgroups for various purposes.

Within Nova Scotia, virtually all public safety agencies have access to TMRS radios. Exceptions include military and Civil Aviation Search and Rescue Association (CASARA) aircraft, and other private or commercial entities, which may provide a support role

For extended or wide area incidents the Mobile Communications Support resources of the Public Safety and Field Communications (PSFC) may be requested to provide links between the various radio communications platforms or to establish local networks and/or link them into the TMRS. This resource is particularly applicable in locations with poor

TMRS coverage or where multiple radio platforms must communicate (cross-band). The PSFC resources can be accessed 24/7 by contacting Shubenacadie Radio at 1-877-293-6977. If the equipment and personnel are available and applicable to the incident, a response will be initiated.

Establishing Networks

The Incident Commander or Communications Unit Leader will establish networks according to the parties involved in the incident response and the radio systems on which they are operating. When all parties involved are using the Nova Scotia Trunked Mobile Radio System (TMRS or TMR2) the easiest method to establish networks is through a request for assignment of Mutual Aid talkgroups, to use the shared simplex frequencies, or common talkgroups designated for communication between two specific agencies (i.e.DNR-VFD). Another method is through the use of TMRS console patches. The ability to effectively utilize any of these facilities should be determined through planning and training prior to an emergency event.

In order to receive authorization to use a Mutual Aid talkgroup, contact must be made with the Operational Control Centre (OCC) for the agency making the request; for EHS this is Ambulance Communications; for RCMP this is RCMP OCC; for all other provincial parties and volunteers this is Shubie Radio. For agencies within HRM the OCC is HRM Integrated Emergency Services. For Cape Breton the OCC is Cape Breton Regional Dispatch. All five OCC's are capable of making console patches although each has limitations as to what talkgroups can be patched together at the console.

Directing a Change in Radio Talkgroup/Channel/Frequency

To prevent interference to other radio communications, or to enable multiple communications paths to operate simultaneously or to coordinate operations by using a common or shared talkgroup or frequency it may be necessary to change channels, talkgroups or frequencies. This can be accomplished using the following procedure:

Example: The Communications Unit Leader for an incident has made a request and has been assigned MUTUAL AID 1 talkgroup and has asked Shubie Radio to advise involved parties.

Shubie Radio transmits: *'Forestry 325, Forestry 203, Officer 87 — this is*

Shubie Radio; switch to the MUTUAL AID 1 talkgroup and acknowledge Incident Command, over. All Stewiacke Fire units, all Brookfield Fire

units, all Hilden Fire units switch to the MUTUAL AID 1 talkgroup and acknowledge Incident Command over’.

The stations answer in turn: ‘*This is (radio call sign) ROGER — switching to MUTUAL AID 1, out.’*

Simultaneously RCMP OCC transmits to involved members: ‘*60 Charlie 1 this is OCC — switch to the MUTUAL AID 1 talkgroup and acknowledge Incident Command over’.*

The RCMP member answers: ‘*This is 60 Charlie 1, ROGER — switching to Mutual Aid 1, out.’*

All Dept. of Lands & Forestry personnel, the three volunteer fire departments and the responding RCMP member switch their radios to the MUTUAL AID 1 talkgroup, listen for other traffic then transmit: ‘*Incident Command this is (radio call sign) acknowledging on MUTUAL AID 1 — over’.*

Incident Command then transmits: ‘*All stations, this is Incident Command, standby for assignment information’.*

Note: Whenever a station moves from the normal operational talkgroup/ channel to a different talkgroup/channel the OCC or dispatch agency of jurisdiction must be advised of how the station can be reached.

Break-In Procedures

On occasion a station having a message of higher priority than a routine transmission in progress may break in and thus suspend the original transmission. In no case shall any station break into a channel/talkgroup which has Radio Silence imposed or which is being used for distress, urgency, or safety messages. In most cases this ‘break’ will be requested by a dispatch operator who has important information of concern to all parties on this channel/talkgroup and who has the ability to pre-empt radio traffic.

The proword ‘**BREAK**’ spoken three times means cease transmission and listen for an incoming message. Silence will be maintained until the station breaking-in has passed its message.

Radio Checks, Signal Strength and Readability

A station is understood to have good signal strength and readability unless otherwise notified. Strength of signals and reliability will not be exchanged unless one station cannot clearly hear another station.

When you require a radio signal check, call another known station and request a signal check. Signal checks should not last more than 10 seconds.

The signal check consists of:

'(Call sign of known station) this is (your call sign) for a radio signal check. How do you read me? Over.'

When replying to a signal check, the following five-level readability scale should be used:

1. Bad (unreadable)
2. Poor (readable now and then)
3. Fair (readable but with difficulty)
4. Good (readable)
5. Excellent (perfectly readable)

Closing Down

When an established multi-agency network is no longer required and is to be closed down, notice must be given to all stations on that network and also to any affected OCC or other dispatch agency. For console patches or for a MUTUAL AID talkgroup assignment the OCC which assigned the talkgroup or created the patch must be the one to close it down.

The normal process will be that the Communications Unit Leader or Incident Commander will make a general broadcast to all mobile stations, then to the affected OCC.

Example: *'All Stations, All Stations, All Stations; this is Incident Command. We are terminating use of the MUTUAL AID 1 talkgroup. All stations shall return to their normal operational talkgroup (channel) — out.'*

Each individual radio user shall then switch to his/her normal operational talkgroup/channel and advise his/her dispatcher of the change.

General Considerations

Periodic Equipment Checks

All radio equipment should be tested periodically to ensure that it is functional, that the user is familiar with it and for portable radios, to ensure the state of battery charge. A radio test with a dispatcher or Operational Control center (OCC) should be done regularly for radios

that are not used daily. Additionally, portable radio battery life can be extended dramatically through the use of a conditioning charger.

Proper Talkgroup/Channel

Periodically during the work period every radio operator must check to ensure his/her radio is on the correct operational talkgroup/channel. This applies particularly to portable radios which may easily be switched to a different talkgroup/channel inadvertently or be switched off accidentally.

Fleetmap/Channel Reference

It is important to realize that the radios of each agency, although they may look like those from another agency, are programmed differently. That is to say, a Department of Natural Resources radio and a Volunteer Fire Department (VFD) radio may look identical, and may have some common talkgroups, however they are programmed very differently. Each agency must ensure its users have the appropriate fleetmap or reference-sheet for their radios.

General Safety

- A. Most portable radios are designed to withstand operation in blowing rain and the most ruggedized radios are designed to withstand short periods of shallow immersion, however following immersion a radio should be air dried thoroughly prior to use. If your radio does not have a seal around the terminals connecting the battery to the radio chassis it must not be considered water resistant in any fashion.
- B. Portable radio battery charging must be done in a dry environment.
- C. Generally mobile radios must be kept dry.
- D. Unless using an IMPRES battery, radios or spare batteries must not be stored in the charger as this will dramatically reduce the useful life cycle.

Nova Scotia TMR2

Overview

Nova Scotia's TMR system is shared by nearly all public safety organizations in the province. The network has multiple tower sites and provides coverage across a large percentage of the province's landmass.

All these tower sites are connected to a master controller at Bell in Halifax.

The TMR System (TMRS) uses a digital platform. Organizations will notice a sharp, crisp voice quality during radio transmissions in a digital environment. The digital conversion of a user's voice reduces external background noise and the digital technology platform is ideal for reducing environmental noise levels during transmission, such as emergency scenes or in windy conditions. Proper positioning of the mic when speaking is paramount. For effective communication, it is imperative that you transmit 5–8 cm (2–3") from the mic.

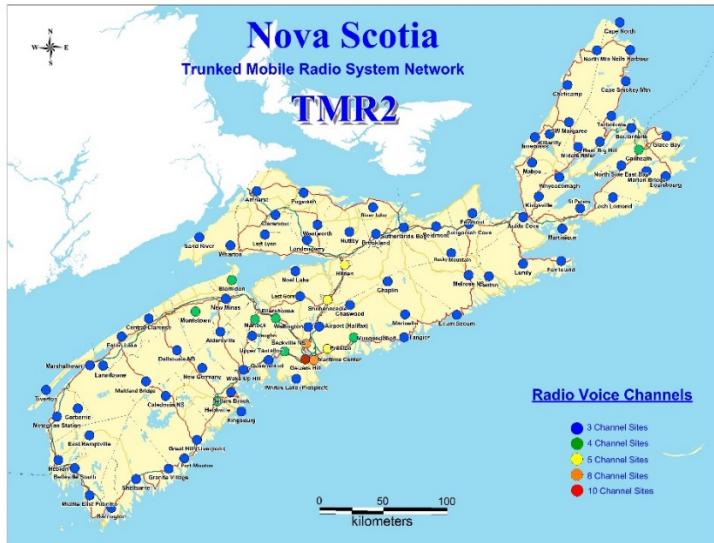
When you turn on your trunked radio, it begins to search for the nearest TMRS site. When the radio connects to a site, the radio will send your radio ID to the master controller informing the system that your radio is now turned on and which talkgroup your radio is resting on. You can communicate with any other radio on that same talkgroup province-wide or maritime-wide.

This system is fully interoperable, with all agencies having one common zone of talkgroups. This allows for each user to easily navigate and communicate with any other user of the system at an incident via their TMR radio. This includes eight Nova Scotia mutual aid talkgroups, three shared simplex channels and two maritime common talkgroups.

All Trunked Mobile Radios in the Maritimes share COMMON 1 and COMMON 2 talkgroups on TMR2 (NS) NBTMR (NB) and PICS2 (PEI).

Prince Edward Island (PEI) and Nova Scotia (NS) share the same master controller. New Brunswick (NB) has its own Master Controller that is connected to Nova Scotia's Master controller which allows seamless Maritime communications.

TMR2 Tower Sites



Site Numbers and Names

Tower Sites —Nova Scotia					
Site #	Site name	Site #	Site Name	Site #	Site Name
1	Sand River	9	Noel Lake	17	New Minas
2	Wharton	10	Shubenacadie	18	Morristown
3	Claremont	11	Chaswood	19	Central Clarence
4	Amherst	12	Airport	20	Dalhousie
5	Pugwash	13	Wellington	21	Eaton Lake
6	Wentworth	14	Ellerhouse	22	Lansdowne
7	Londonderry	15	Martock	23	Marshalltown
8	Hilden	16	Blomidon	24	Tiverton
25	Corberrie	28	Hebron	31	Barrington

26	Meteghan	29	Belleville South	32	Shelburne
27	East Kemptville	30	Pubnico	33	Granite Village
34	Great Hill	53	Ecum Secum	72	North Mountain
35	Caledonia	54	Melrose	73	Cheticamp
36	Hebbville	55	Fenton	74	SW Margaree
37	Kingsburg	56	Lundy	75	Kiltarlity
38	Sellars Brook	57	Fox Island	76	Inverness
39	New Germany	58	Martinique	77	Mabou
40	Wakeup Hill	59	Loch Lomond	78	Whycocomagh
41	Aldersville	60	Louisbourg	79	Kingsville
42	Queensland	61	Marion Bridge	80	Aulds Cove
43	Tantallon	62	East Bay	81	Fairmont
44	Whites Lake	63	Coxheath	82	Antigonish
45	Geizers Hill	64	Glace Bay	83	Piedmont
46	Maritime Center	65	Boularderie	84	Sutherlands Bog
47	Sackville	66	Tarbotvale	85	Brookland
48	Preston	67	Rear Big Hill	86	Nuttby
49	Musquodoboit	68	Middle River	87	Site on Wheels
50	Tangier	69	Cape Smokey	88	St. Peters
51	Marinette	70	Neils Harbour	89	Maitland Bridge
90	Rocky Mountain	93	River John	96	Vaughn
91	Middle Ohio	94	Clark's Harbour	97	East Gore
92	East Lynn	95	Sherbrooke	98	Port Mouton

Tower Sites — Prince Edward Island					
Site #	Site name	Site #	Site Name	Site #	Site Name
100	EI Mira	105	Stanhope	110	Tignish
101	Souris	106	Churchill	111	Belvedere
102	Summerville	107	Mount Pleasant	112	Cavendish
103	Caledonia	108	O'Leary	113	Borden
104	West St. Peters	109	Alma	114	Richmond

Tower Sites —New Brunswick					
Site #	Site name	Site #	Site Name	Site #	Site Name
1	Benton Ridge	32	Fundy Park	69	Kintore (DTI)
2	Bristol	33	Grand Manan	70	Lameque (DTI)
3	Buckley Mtn	34	Deersdale	71	Lorne (DTI)
4	Campbellton	35	Mactaquac	72	Maces Bay (DTI)
5	Cap Pele	36	Melrose NB	73	McAdam (DTI)
6	Chamcook	37	Penobsquis	74	Newburg (DTI)
7	Coburn	38	Redmondville	75	Oak Hill (DTI)
8	Dalhousie NB	39	Salisbury	76	Parker Ridge (DTI)
9	Dumfries	40	St. Martins	77	Pleasant Ridge (DTI)
10	Durham Bridge	41	Sussex (Hazel Hill)	78	Riceville (DTI)
11	Four Falls	42	Royal Road	79	Robinson (DTI)
12	Jemseg	43	Popple Hill	80	Saint John (DTI)
13	Lavillette	50	Acadieville (DTI)	81	Scotch Mtn (DTI)
14	Neguac	51	Allardville (DTI)	82	Seven Mile Ridge (DTI)

15	New Denmark	52	Baie Ste. Anne (DTI)	83	Skiff Lake (DTI)
16	Newcastle	53	Bathurst Hospital (DTI)	84	South St. Norbert (DTI)
17	Norton	54	Campobello (DTI)	85	St. George (DTI)
18	Petersville Hill	55	Castaway (DTI)	86	St. Isidore (DTI)
19	Richibucto	56	Chaplin Island (DTI)	87	St. Leolin (DTI)
20	Riverside Albert	57	Crabbe Mtn (DTI)	88	Hibernia Hts (DTI)
21	Route 880	58	Doaktown (DTI)	89	St. Quentin (DTI)
22	Shediac	59	Elmtree (DTI)	90	St. Stephen (DTI)
23	St. Anne	60	Fairfield (DTI)	91	Stanley (DTI)
24	Tracy	61	Forestry Tech FCTN (DTI)	92	Tracadie (DTI)
25	Veener Mill	62	Gowland Mtn (DTI)	93	Upham (DTI)
26	Baker Lake	63	Grand Falls (DTI)	94	Oromocto Water Tower
27	Bethel	64	Grove Hill (DTI)	100	Hardwood Ridge (NBP)
28	Blackville	65	Harcourt (DTI)	101	Otty Glen (NBP)
29	Buctouche	66	Bettesburg (DTI)	102	Blanchette (CBC)
30	Caraquet	67	Indian Mtn A (DTI)		
31	Clair	68	Kenneth Mtn (DTI)		

Mutual Aid Talkgroups

All TMR radios share eight Mutual Aid talkgroups. Mutual Aid allows direct communications with various agencies on one voice channel. This decreases the chances of receiving a busy tone at an incident.

Permission is required to use a Mutual Aid talkgroup:

1. Contact one of the following dispatch points that is most applicable to your organization for the assignment of a Mutual Aid talkgroup: Shubie Radio, Emergency Health Services (EHS), and Royal Canadian Mounted Police (RCMP), Integrated Emergency Services (IES) & Cape Breton Regional Dispatch.

2. Advise the dispatcher of who is to be notified of the talkgroup assignment (be sure you receive a radio check from each party you have requested to join).

Shared Simplex Channels

Simplex is direct radio-to-radio communication. These channels provide another interoperable tool for communications.

- All public safety agencies that use TMR have three shared simplex channels.
- Simplex is only reliable for roughly 1 to 2 km from a portable radio, up to 5 km for a mobile radio.
- Permission is not required when using the simplex channels, but a person must first voice-call on the desired channel to verify if anyone in the area is using that channel.

The Nova Scotia channels SX ALL 1, 2 and 3 correspond with three nationwide interoperability simplex channels. These channels allow responders from across Canada to communicate with one another when communicating in other jurisdictions within Canada. Because these channels are used by responders across Canada, special protocols are required for accessing these channels.

Simplex All 1, Simplex All 2 and Simplex All 3

SX All 1 - National Calling Channel (ICALL)

SX All 2- National Working Channel (ITAC-1)

SX All 3- National Working Channel (ITAC-2)

Where an incident is operating on a simplex channel, the ICALL channel (SX ALL 1) shall be used as a hailing channel to establish communications. SX ALL 1 can also be used to contact other users in the Region for the purpose of requesting incident related information and assistance. If necessary, the calling party will be asked to move to one of the ITAC channels (SX ALL 2 & 3) for continuing incident operations or other interoperability communication needs.

The ITAC channels are to be used primarily for coordination activity between different agencies in a mutual aid situation, or emergency activities of a single agency. Incidents requiring multi-agency participation may be coordinated over these channels by the agency controlling the incident.

Some communications may be best managed using simplex frequencies because they:

- Remove traffic from the TMRS repeaters.
- Can be used in poor system coverage areas, and
- Keeps TMR resources available.

Simplex frequencies have limited range and provide no contact with dispatch. There are no tones (such as the “go ahead” or “busy tone”) on the simplex channels. If you wish to use a simplex channel in a particular area, switch to that simplex channel and listen to see if anyone is actively on the channel.

- If the channel is free, voice call “Are there any stations using this channel? Over”
- If no one answers, you are free to use the channel.
- If you do receive a reply stating that the channel is in use, switch to another simplex channel.

Radio/System Tones

The TMRS radios generate various tones to indicate different things to the user. These tones are important because you will need to react to each of them in different ways:

Go-Ahead: A fast, high pitched three-note tone (triple chirp) that tells you the radio is connected to the system and you can ‘go-ahead’ and talk. If you don’t hear this tone, you are talking to yourself.

System Busy: This is like a fast telephone busy signal - a mid-range beep tone about every half-second. This signal means all the repeaters on the site you are connected with are currently busy with other radio traffic.

Wait a few seconds and the radio will give you the ‘Go-Ahead’ tone.

Bonk: A low pitched repeating bonk sound that means the radio has lost contact with the system. This is caused by poor coverage or loose or damaged antenna. Also, if you attempt to transmit while another user is talking on the talkgroup you are trying to communicate on, the radio will ‘Bonk’ and not allow two radios to transmit on the same talkgroup at the same time.

Radio – LED Lights

Both the portable and mobile radios have a series of red, yellow and green LED lights that indicate various items on the radio which are as follows:

LED LIGHTS	RED	YELLOW	GREEN
Mobile			
Solid	Radio is transmitting	Indicates traffic on a simplex channel	Self-test being performed
Flashing	Radio is trying to access system	N/A	N/A
Portable			
Solid	Radio is transmitting	N/A	Self-test being performed
Flashing	Low Battery (lights while transmitting)	N/A	N/A
Flashing	Intermittent flashing - trying to connect to a TMR site or re-affiliating to a site	N/A	N/A

How to Transmit and Receive on a TMR

- Select the desired talk group on the radio
- Listen for ongoing conversations; if the channel becomes clear, proceed with your call.
- Lift the mic, press and hold the PTT button to transmit and wait for the “Talk Permit” tone.
- If you hear three quick tones (go ahead tones), proceed with your message. Remember keep the microphone 5-8 cm (2-3”) from your mouth.
- If you hear a busy tone and the yellow busy indicator flashes, all trunked channels are in use.
- You can continue to hold the PTT down, (listening to the busy tone) and when the repeater is free you will receive the go ahead tone and you can begin to communicate, or press the PTT and

receive a busy tone you can release the PTT button and wait for the go ahead tone. Within three seconds of hearing these tones, press and hold the PTT button to transmit your message.

- Release the PTT button to receive (listen).
- If another user is transmitting on the talkgroup and you attempt to transmit, you will be alerted by a “bonk.” Simply wait until the user has completed their message and proceed with yours.

TMR Agencies

In Nova Scotia, virtually all frontline emergency service providers utilize the TMR2 system for communications.

Provincial government departments such as;

- Department of Natural Resources
- Department of Health
- Department of Environment
- Department of Fisheries and Aquaculture
- Department of Justice
- Department of Transportation and Infrastructure Renewal
- Department of Internal Services
- Office of the Fire Marshal
- Emergency Management Office
- Community Services

Federal Government Departments such as;

- Royal Canadian Mounted Police (RCMP)
- Department of Fisheries and Oceans
- Parks Canada
- Canada Border Services agencies
- Environment Canada
- Coast Guard /JRCC & Department of National Defense

Municipalities;

- Halifax Regional Municipality services
- Cape Breton Regional Police and Fire
- All Fire Departments in Nova Scotia
- All Ground Search and Rescue Teams
- Municipal EMO

- Red Cross /Salvation Army
- Hazmat teams

Others;

- Gas pipeline operators • Industry emergency services • This is not a complete list.

Potential Problems with Systems and Equipment

The TMR 2 system is a very stable communications platform with many redundancies built into the system and network. There are only a few failure scenarios that can occur within the TMRS:

- Blocked roads could prevent access to recharge tower site batteries meaning sites without generators could fail. All sites have a battery backup to allow for uninterrupted service during power interruptions of up to eight hours. Many sites have generator backup.
- Coverage limitations in some remote areas.

Site Trunking

- One or more sites can independently go ‘Site Trunking’ due to backhaul failure. (Backhaul is the wire or fiber optic link from the tower to the central controller)
- ‘Site Trunking’ can sever a site from the wider network, but it will continue to function within a local footprint.
- When in “Site Trunking” each site functions for all users within its own footprint but allows no access to dispatch or to units outside the affected footprint(s).

Failsoft

If the trunking site loses its control channel (channel that transmits data for the system, and not voice) or has certain other failures, it is no longer able to operate in the trunking mode (normal operations). So instead of going into a condition that stops all communication, the system enters Failsoft.

In this state all transmitters (channels) turn on and operate in a ‘conventional’ repeater mode. The subscriber radios are able to recognize this state and switch to a predetermined frequency (one of the trunk system frequencies) depending on their selected talkgroup.

For example, if a site is in Failsoft, all users associated with the tower (i.e. Fire, Police, EHS, etc.) would end up on a single channel, rather than different agencies being assigned different channels. Everyone within range of the tower in Failsoft will share this single channel. The radio will attempt to avoid Failsoft mode by first seeking other sites that are working properly.

When a TMR site enters Failsoft, all users on that site will use the same channel and will be able to hear each other's communications, however, encrypted users and clear users will not hear each other. See Appendix G for a diagram of how Failsoft works.

Batteries

Common Types of Radio Batteries

IMPRES

IMPRES batteries when used with an IMPRES charger provide automatic, adaptive reconditioning, end-of-life display, and other advanced features.

IMPRES chargers have technology that avoids overcharging. IMPRES batteries may be left in IMPRES chargers for extended periods. IMPRES chargers are compatible with non-IMPRES batteries; however, the IMPRES features are only realized when using IMPRES batteries and chargers together. It is NOT recommended that an IMPRES battery be charged in an non-IMPRES charger.

UNCHARGEABLE		+		FLASHING RED
WAITING TO CHARGE		+		FLASHING ORANGE
RAPID CHARGING		+		STEADY RED
CHARGED (90% CAPACITY)		+		FLASHING GREEN
FULLY CHARGED		+		STEADY GREEN
SERVICE LIFE		+		FLASHING RED/GREEN
RECONDITIONING		+		STEADY ORANGE

Please note when battery charger indicator light is showing steady orange, this indicates that the battery is reconditioning and may not be available for use for several hours.

To override the conditioning cycle, remove battery from charger quickly and re-insert.

Nickel Cadmium (NiCd)

Among rechargeable batteries, the NiCd remains a popular choice for two-way radio applications and is one of the most rugged rechargeable batteries available. The NiCd prefers a fast charge to a slow charge. This battery is a strong, silent worker and hard labor poses no problem BUT it should not be left in a charger for days or be used only occasionally for brief periods. A periodic FULL discharge is very important. If this does not occur, large crystals form on the cell plates, thus decreasing battery capacity and performance.

NiCd Advantages:

- Fast and simple charge — even after prolonged storage.
- High number of charge/discharge cycles – if properly maintained over 1000 cycles are possible.
- Allows recharging at low temperatures.
- Long shelf life in any state of charge.
- Good low temperature performance.
- Economically priced.

NiCd Limitations:

- Develops memory effect.
- Relatively high self-discharge rate during storage.

Nickel-Metal Hydride (NiMH)

The modern NiMH battery offers up to 40% higher energy density as compared to the NiCd. Both NiCd and NiMH batteries have high selfdischarge rates. The NiCd loses about 10% of its capacity within the first 24 hours, after which the rate settles to about 10% per month. The self-discharge rate of the NiMH battery is about one and a half to two times greater compared to NiCd. This type of battery is widely accepted to be the interim step to lithium battery technology.

NiMH Advantages:

- 30-40 % higher capacity than a standard NiCd.
- Less prone to memory effect than the NiCd — periodic cycles are required less often.

NiMH Limitations:

- Limited service life — if repeatedly deep cycled, especially at high load currents, the performance starts to deteriorate after 200 to 300 cycles. Shallow rather than deep discharge cycles are preferred.
- NiMH batteries generate more heat during charge and require a longer charge time than the NiCd. The trickle charge is critical and must be controlled carefully.
- NiMH has about 50% higher self-discharge rate as compared to NiCd.
- Performance degrades if stored at elevated temperatures.

Lithium Ion (Li-ion)

The energy density of the Li-ion battery is typically twice that of the standard NiCd. There is no memory effect and no scheduled cycling is required to prolong the battery's life. In addition, the self-discharge rate is less than half compared to NiCd and NiMH.

Li-ion Advantages:

- High energy density.
- Relatively low self-discharge rate.
- Low maintenance — no periodic discharge necessary, no memory effect.

Li-ion Limitations:

- Subject to aging, even if not in use.
- More expensive than NiCd and NiMH.

- Discharge rapidly in cold conditions.

Installing and Removing the Battery on most TMR units

To install the battery:

1. Turn the radio off.
2. Align the three tabs at the bottom of the battery with the three slots at the bottom of the back of the radio.
3. Angle the battery forward toward the radio until the battery clicks into place.

To remove the battery:

1. Turn the radio off.
2. Holding the radio in one hand, push down on the battery release slides on both sides of the battery with the other hand.
3. Angle the battery away from the radio and remove.

Radio Repair Procedure

TMR system users should consult with their radio or user group coordinator for direction on radio repairs.

Mobile Communications Support

PSFC provides on scene communications support and equipment support for both emergency incidents and planned events that may impact public safety. The PSFC Office has several specially equipped vehicles with extra radios, antennas, battery chargers, repeaters, linking devices, and other equipment that can be provided to any emergency services personnel at exercises and emergency events. For example, staff has responded with equipment to events such as forest fires, ground search and rescue incidents, water rescues, major public gatherings, and outages offixed communications networks. The support team has extensive technical and operational communications training and brings expertise in communications planning (in advance or during an event) as well as significant equipment assets, which are all available at no cost.

This service is available on a 24/7/365 basis and can be activated by contacting Shubie Radio at 1-877-293-6977.

Please note that this support depends on staff availability and concurrent provincial demand. Coordination with EMO NS may be required for deployment priorities.

For more information visit:

<http://novascotia.ca/is/programs-and-services/psfc.asp>

Interesting Links

Maritime Amateur:

<http://www.maritimeamateur.ca/>

RIC22 (Radio Communication Information Circular):

<http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01020.html>

General Message Form (ICS 213), Communications Log (ICS 309), and Incident Communications Form (ICS 205)

General

It is important to keep accurate records of communications; Appendices A, B, and C provide the applicable ICS forms. In addition to the obvious requirements for accuracy and clarity due to the situation, message forms and station logs are legal documents that must be retained after the emergency has been resolved. Your dispatch center may be able to provide you with voice recordings, if required.

Entries on the ICS Forms must be neatly printed in ink; corrections shall be initialed. Generally, only strategic communications will be formally recorded in written format; tactical communications will be too intense and rapid to permit written records.

Appendix A: General Message Form ICS 213

ICS 		
General Message (ICS 213)		
T ~	POSITION	
FROM	POSITION	
SUBJECT	DAT ~	TIME
MESSAGE		
SIGNATURE	POSITION	
REPL ~		
DAT ~	TIME	SIGNATURE/POSITION

Appendix B: Communications Log ICS 309



Communications Log (ICS 309)

Appendix C: Incident Communications Form ICS 205

**ICS Form 205**

INCIDENT RADIO COMMUNICATIONS PLAN		1. INCIDENT NAME	2. DATE/TIME PREPARED	3. OPERATIONAL PERIOD DATE/TIME E	
4. BASIC RADIO CHANNEL UTILIZATION					
System/Type	Channel	Function	Frequency/Tone	Assignment	Remarks
5. PREPARED BY (Communications Unit)					

ICS 205

Appendix D: Table of Acronyms and Terms

CASARA	Civil Air Search and Rescue Association – private pilots with aircraft
CBSA	Canada Border Services Agency
CCG	Canadian Coast Guard

COM-A	Communication Advisor
DFO	Department of Fisheries and Oceans
ECC	Emergency Coordination Center
EMO	Emergency Management Organization
EMONS	Emergency Management Office Nova Scotia
EMC	Emergency Management Coordinator (Municipal)
EOC	Emergency Operations Center
FERP	Federal Emergency Response Plan
Fleetmap	The document that outlines the talkgroups/frequencies of an agency's radio
GOG	General Operating Guidelines
GSAR	Ground Search and Rescue
HRM	Halifax Regional Municipality
ICS	Incident Command System
IES	Integrated Emergency Services (HRM consolidated dispatch)
JRCC	Joint Rescue Coordination Centre – coordinator of response resources for vessels on saltwater and aircraft in distress
MA	MUTUAL AID (talkgroup)
MCS	Mobile Communications Support team of PSFC office
MOU	Memorandum of Understanding
Net	short for network – a group of radios communicating on a common platform
NSCIP	Nova Scotia Communication Interoperability Plan
NSIMRS	Nova Scotia Integrated Mobile Radio Service
OCC	Operational Control Centre (dispatch)
PECC	Provincial Emergency Coordination Center
PNS	Province of Nova Scotia
PSC	Public Safety Canada
PSFC	Public Safety and Field Communications – office of NS Internal Services
REMC	Regional Emergency Management Coordinator
REMO	Regional Emergency Management Organization – multiple municipalities
RETT	Range Extending Telecommunications Trailer

SOP	Standard Operating Procedures
TMRS	Trunked Mobile Radio System – NS public safety network
UHF	Ultra-High Frequency – 174-850 MHz band of radio spectrum
VHF	Very High Frequency – 118-174 MHz band of radio spectrum

Appendix E: Procedural Words (Prowords) or Phrases and their Meanings

ACKNOWLEDGE	Let me know that you have received and understood this message.
AFFIRMATIVE	Yes, or permission granted.
BREAK	Indicates the separation between portions of a message. (Used when there is no clear distinction between portions of a message.) May be repeated to request urgent access to a channel/talkgroup.
CHANNEL	Change to channel ... before proceeding.
CLEARED	Authorized to proceed under conditions specified.
CONFIRM	I have received the following ... or did you receive the message?
CORRECTION	An error has been made in this transmission (message indicated). The correct version is
DISREGARD	Consider this transmission as not sent.
GO AHEAD	Proceed with your message.
HOW DO YOU READ?	What is the readability of my transmission?
I SAY AGAIN	Self-explanatory (use instead of "I REPEAT").
MAYDAY	The spoken word for distress communications. Repeated three times.
MAYDAY RELAY	The spoken word for the distress relay signal.
MONITOR	Listen on (frequency/talkgroup).
NEGATIVE	No, or that is not correct, or I do not agree.
OUT	Conversation is ended and no response is expected.
OVER	My transmission is ended, and I expect a response from you.
PAN PAN	The spoken word for urgency communications. Repeated three times.
READ BACK	Repeat all, or a specified part of a message back exactly as received (do not use the word 'REPEAT').
ROGER	I have received all of your last transmission.

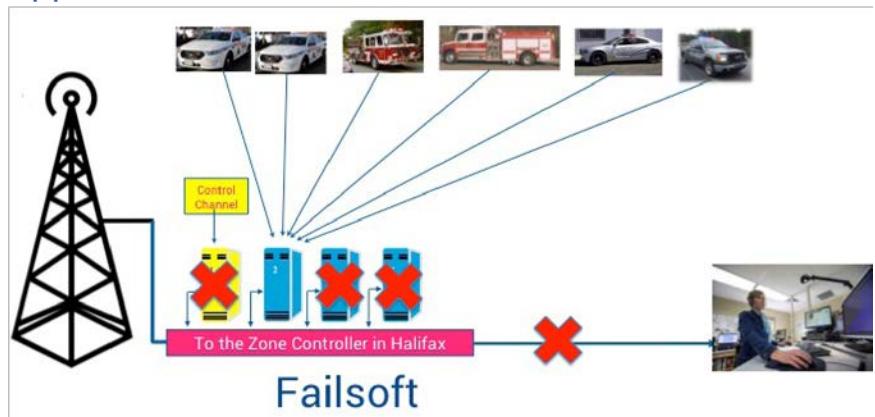
ROGER NUMBER	I have received your message Number ____.
SAY AGAIN	Self-explanatory. (Do not use the word "REPEAT".)

SECURITÉ	The spoken word for safety of navigation or important meteorological warnings that will, or could, affect ships, aircraft or persons. Repeated three times.
STAND BY	I must pause for a few seconds or minutes, please wait and I will call you.
SEELONCE	An international expression to indicate that silence has been imposed on the frequency/talkgroup due to a distress situation.
SEELONCE FEENEE	An international expression to indicate that the distress situation has ended.
SEELONCE MAYDAY	An international expression to advise that a distress situation is in progress. The command comes from the station in control of the distress traffic.
THAT IS CORRECT	Self-explanatory.
VERIFY	Check coding, check text with originator and send correct version.
WILCO	Your instructions received, understood and will be complied with.
WORDS TWICE	(a) As a request: Communication is difficult, please send each word, or group of words, twice. (b) As information: Since communication is difficult, I will send each word or group of words, twice.

Appendix F: Site Trunking



Appendix G: Failsoft



Notes:

Nova Scotia Public Safety Radio Communications User Guide

March 2020

