HF/VHF/UHF RADIO COMMUNICATION IN UN MISSIONS

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RSCE/ICTS/Radio Communication

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HF/VHF/ UHF Radio Communication

Radio Communications is the fundamental tool in peacekeeping used for personal safety and in military operations

Objective:

- To aid personnel in operating HF/VHF/ UHF digital radio systems to achieve a successful Radio communication in UN missions

Standard:

- Standard is met when personnel deployed, can successfully identify the basic components of Radio system
- Able to put the components into a system, and perform Radio check without any difficulties

Radio Walki-Talkie History

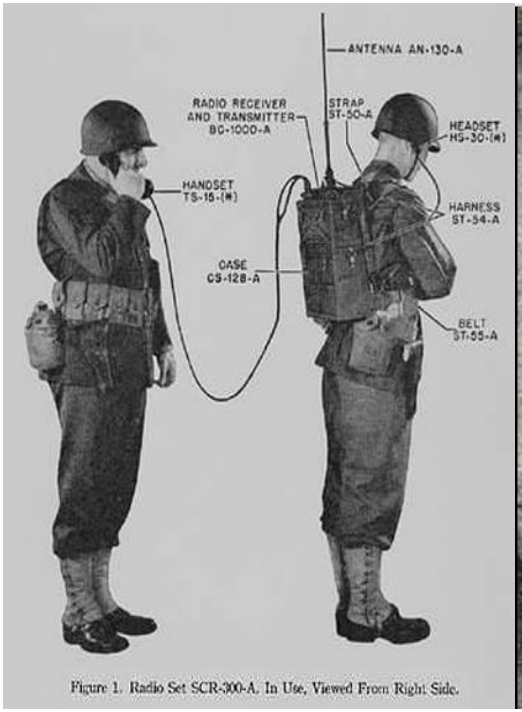


Figure 1. Radio Set SCR-300-A. In Use, Viewed From Right Side.

MTP3250


MTM5400


MTP 3550


MTP850

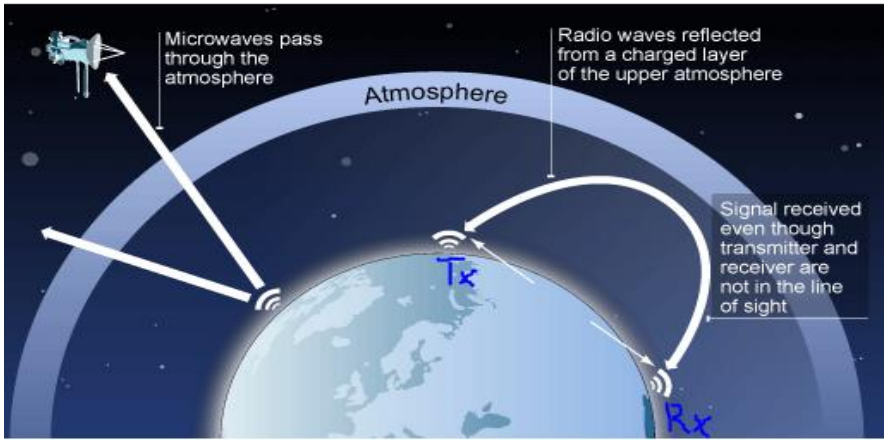
- Developed by US military, WW II
- Motorola SCR300- Back pack, 1940 (Galvin Manufacturing Co)

Topic Covered

- What is a HF,VHF and UHF Radio communication system?
- What are the characteristics, frequencies and capabilities of HF,VHF and UHF ?
- What is digital Tetra Trunking system
- Benefits of Trunking system over conventional VHF system

Radio Communication

- Communication by Radio means:
  - Transfer of Intelligence
  - Electromagnetic waves
  - Frequency
- Frequency Spectrum



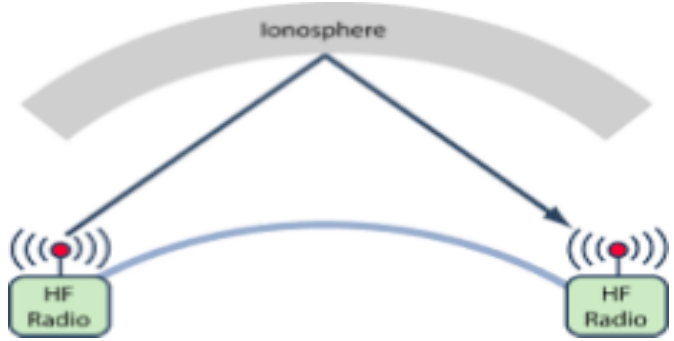
LF	30-300 kHz	10,000 - 1,000 m
MF	300-3000 kHz	1,000-100m
HF	3-30 MHz	100-10m
VHF	30-300 MHz	10-1m
UHF	300-3000MHz	100-10cm
MW	3 to 30 GHZ	10-1 cm

Means of Radio Communication

- HF Communication
- VHF Communication
- UHF Communication
- M/W Communication

HF Communication

- HF is high frequency radio communication, 3-30 MHZ band in radio spectrum



- Propagation:
  a. Ground waves
  b. Ionosphere propagations

- Advantages HF radio communication:
  a. No ongoing cost for additional physical infrastructures.
  b. Can communicate over short, medium and long distance without VHF or UHF repeaters or satellites.
  c. Global communication coverage with limitations

Factors Affecting HF Communications

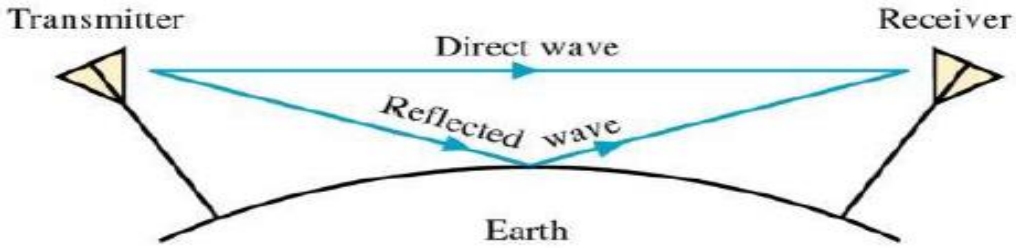
- Frequency
- Distance
- Time of Day
- Weather
- Transceiver Power

VHF/UHF Communication

- VHF is an abbreviation for Very High Frequency
- Frequency range is defined as 30- 300 MHz band in frequency spectrum
- This radio communication is short-range LOS (line of site)
- The coverage for VHF communications will typically be 2 to 20 miles depending on type of system used, antenna height and terrain
- VHF system operates on dedicated frequencies (channels) per group of users
- VHF is conventional radio system used to be operational in UN missions (obsolete)

Characteristic of VHF/UHF

- Unlike HF, the VHF/UHF signals does not reflect from Ionosphere
- Signals are restricted to AO (area of operation), Line of sight
- VHF/UHF signals are less effected by atmospheric noise and interference from electrical equipment than HF signals.
- VHF/UHF signals travel fairly direct wave from one station to another.



UHF Radio Communication

- There is not much difference between VHF and UHF
- UHF stands for Ultra High frequency communication
- Does not Travel as far as VHF signals (reduced range)
- Wider frequency spectrum (great coverage)
- Frequency range defined 300-3000MHZ
- Little interference from other users

Uses of VHF/UHF

VHF/UHF Communication is used for many applications as:

- Traffic Control
- Police Duties
- Mobile Communication
- Disaster management
- UN Missions

Frequency Policy

- Frequency regulation is being supervised by host government agency (e.g UCC, Uganda Communication Commission)
- UN field mission VHF radios operate in 153 - 172 MHz band
- UHF radios are operated in 380-430 MHZ band
- Mission has to apply for a set of frequency in specific band or whole band as operational requirement

Which is better VHF or UHF

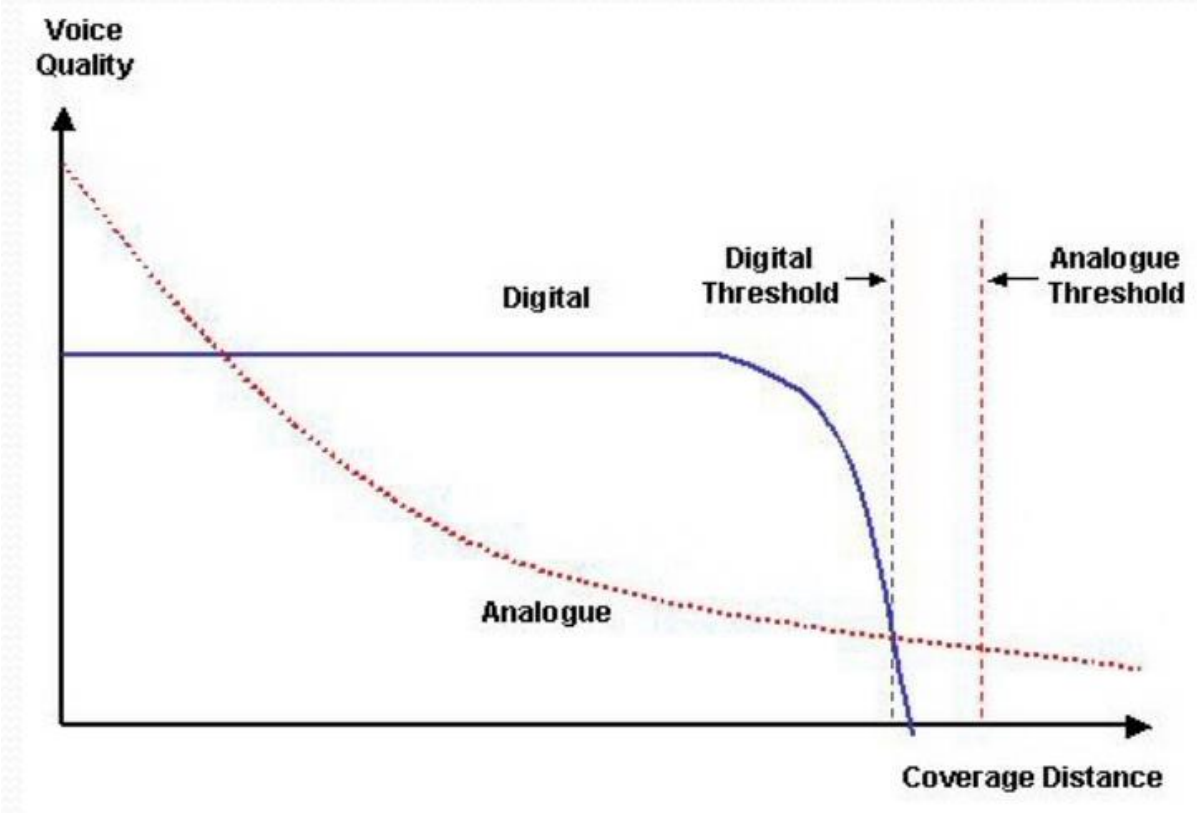
- Understanding difference between VHF and UHF two-way radios
- Each one has its own pros and cons, and each suit different needs.

Which is better VHF or UHF……conti

VHF	UHF
Very High Frequency	Ultra High Frequency
Frequency band 30-300 MHz	Frequency band 300-3000 MHZ
Broadcast range	don't travel far long
Less channels	More channels
More Congestion & interference	Less congestion & interference
Less expensive	Comparatively expensive
Ideal for out doors; agricultural and industrial area	Ideal for indoor communication
Signal degradation	Less signal degradation
operate in small organization	Ideal for bigger organization
Less penetration in buildings and vegetation	Better penetration in building such as concrete, steel, wood

Digital Tetra Trunking system

- Why Digital ?

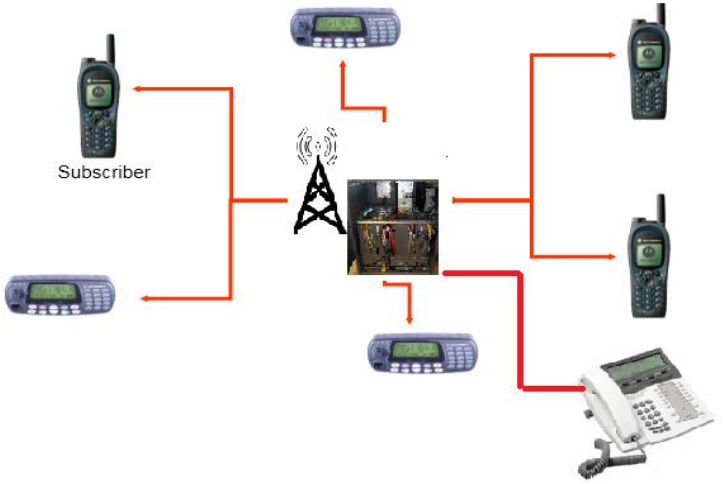


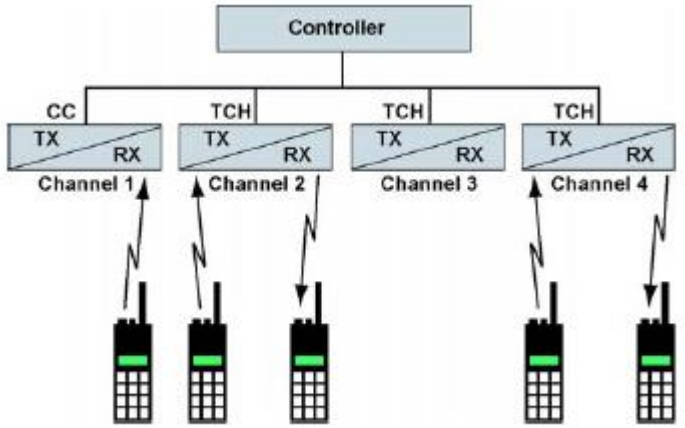
Digital TETRA Trunking System

- Digital
- TETRA
  - Terrestrial Trunk Radio system. It was introduced by
- TETRA operates in UHF band
- Frequency band 400 MHZ
- Frequency range 380-410 MHZ (Public Safety)

Basic TETRA Concepts

- Allows resource to potential users
- Single channel into multiple users in digital way (TDM)
- Resource management
- Improves efficiency of channels
- Call authentication
- Voice encryption and secure
- Packet data services
- Tracking (GPS)

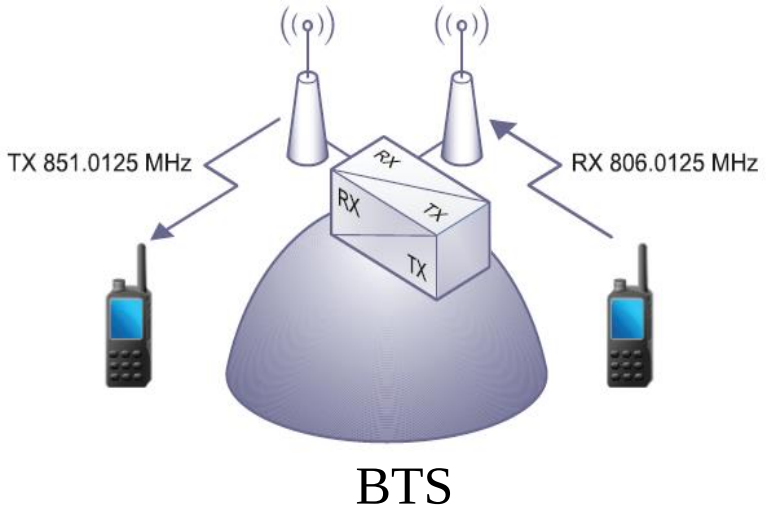




Communication Type

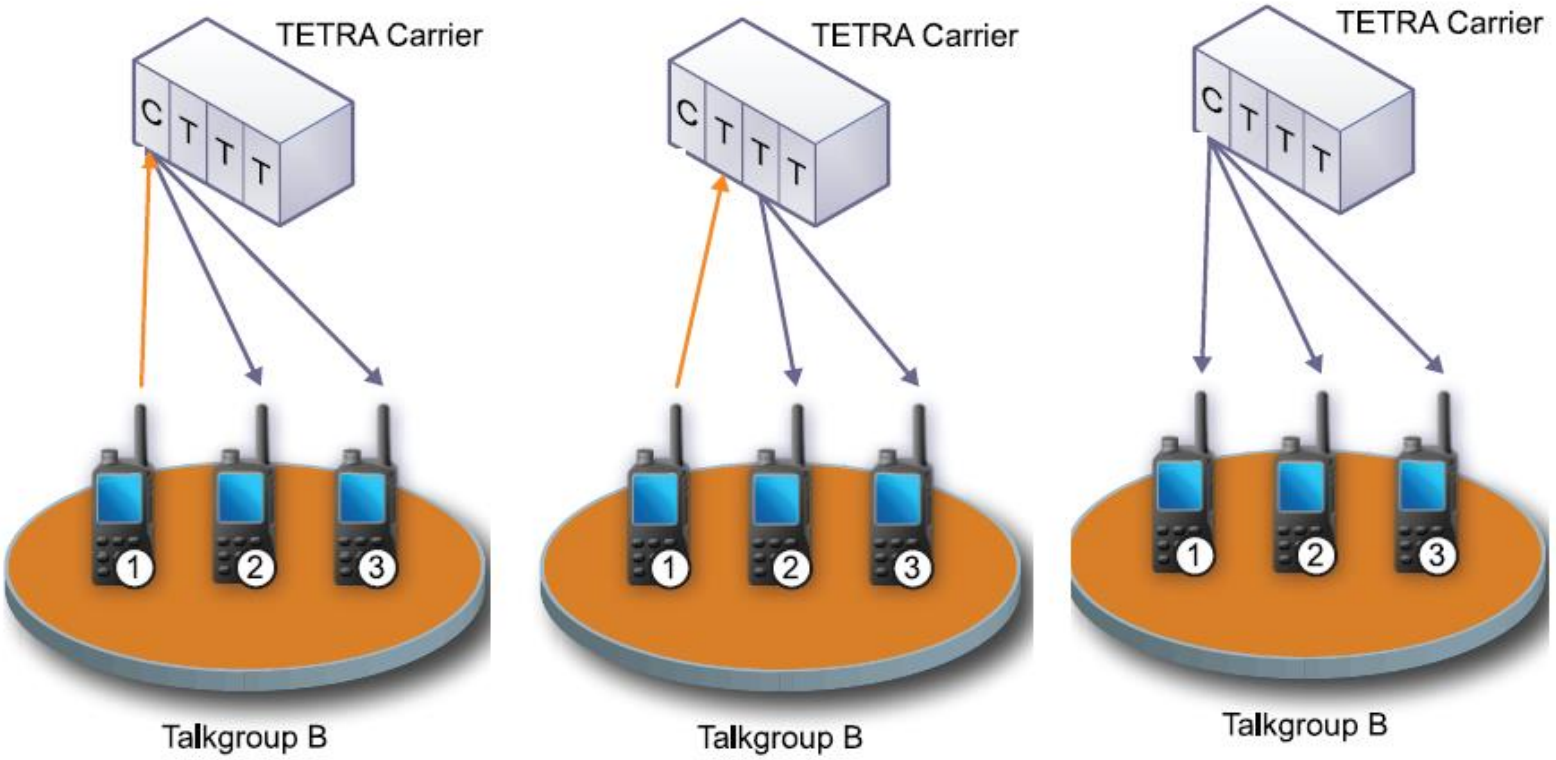
- Simplex Communication

- Duplex Communication



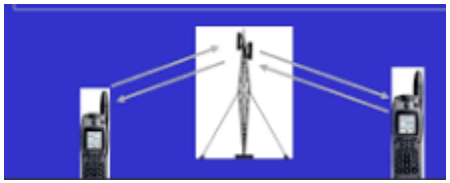
Call Types

- Group calls



Call types…..cont.

- Private Calls:
  a) Radio to Radio



  b) Radio to Extension or vice versa

- Intra and inter-mission calls
  a) Radio can call within the mission and from one mission to another mission

Types of Radios (Tetra)

MTP850

MTP3250

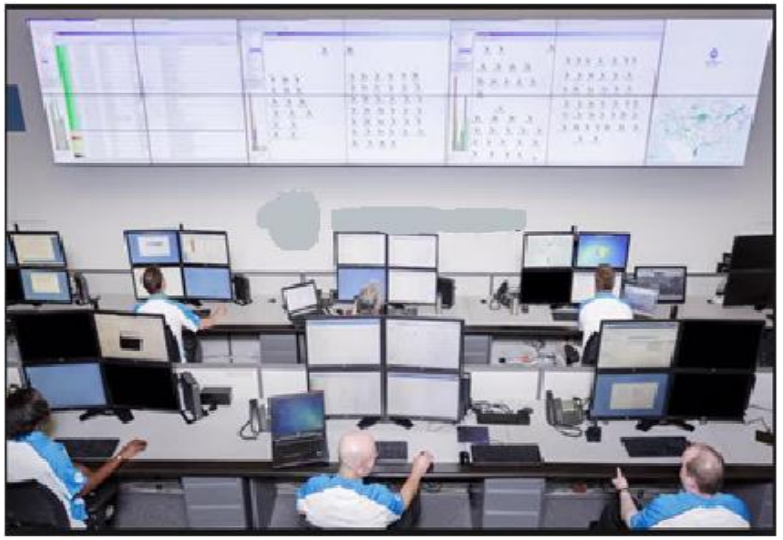
MTM5400

UHF (Tetra Radios)

VHF Radio

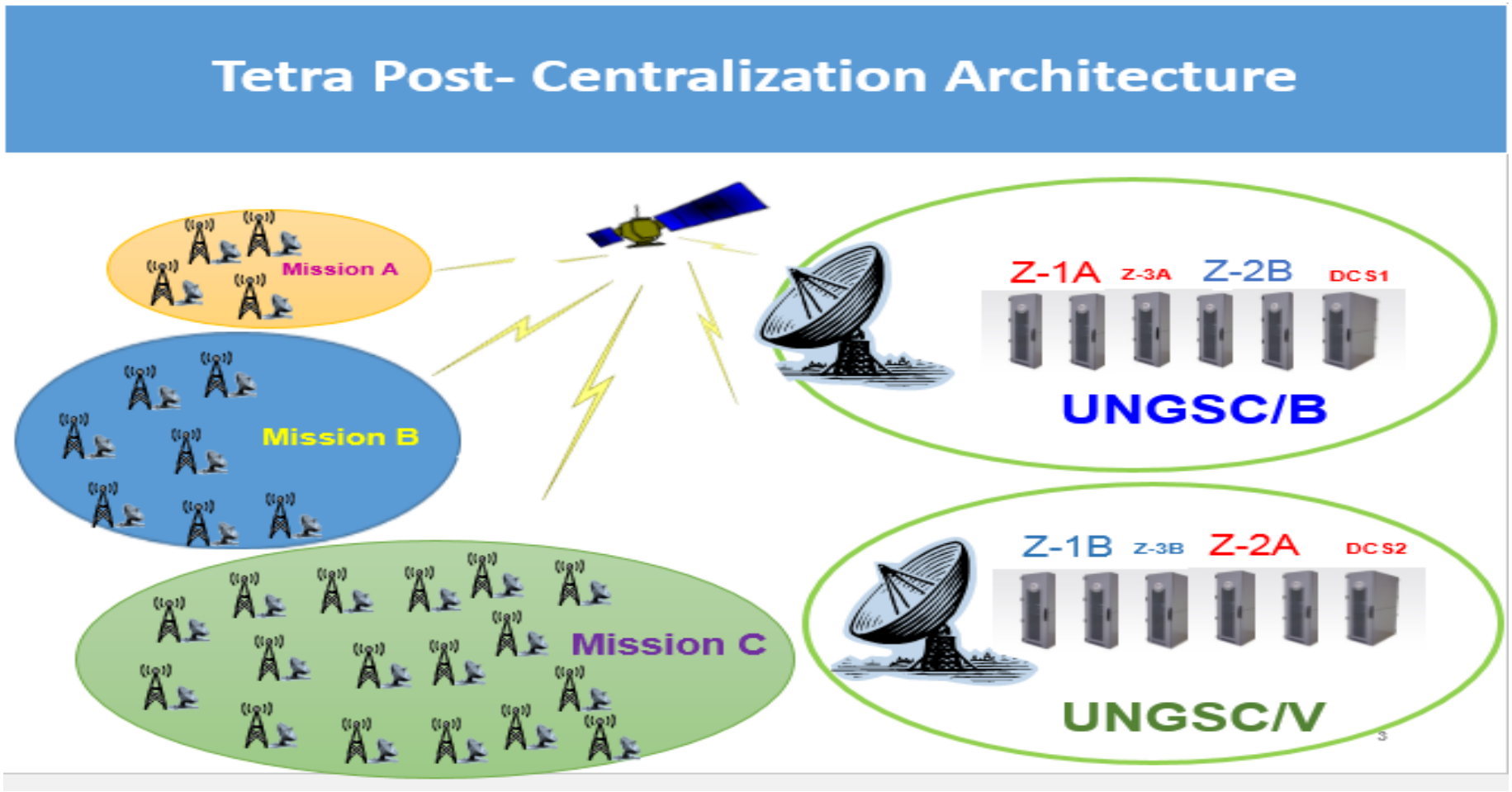
UHF (TETRA) Radio Operation

Field patrol



Dispatch Center

TETRA Connectivity Overview



Other TETRA Features

- Disable and enable radio terminals over the air.
- Offers Short Messaging Services (SMS)
- Terminals are configured with Individual Short Subscriber Identities (ISSI) e.g 600670
- The users are classified according to talk-groups and geographical areas.
- The UN-Common talk-group has been dedicated for radio checks in daily basis

Radio Operators

- Personnel who manage Radio Communication Centers
- Responsible for monitoring and managing the communication networks
- Networks can be UHF TETRA OR HF CODAN networks
- They receive messages and send out messages using the appropriate radio networks
- Operators are in position to understand which is the appropriate means of communication system
- Radio operators understand the radio equipment specifications.

Radio Operators

- Radio checks are procedural security events that UN staff are supposed to perform to announce their presence within the mission area for the purposes of personnel accountability.

- These may be done daily or as per requirements of the mission.

Radio procedures

- Radio procedures required by the UN are the use of phonetical alphabet and numerals;

Letter - Phonetic	Letter - Phonetic	Letter - Phonetic	Letter - Phonetic
A - Alpha	H - Hotel	O – Oscar	V – Victor
B – Bravo	I - India	P – Papa	W – Whiskey
C – Charlie	J – Juliet	Q – Quebec	X – X-Ray
D – Delta	K – Kilo	R – Romeo	Y – Yankee
E – Echo	L - Lima	S – Sierra	Z - Zulu
F - Foxtrot	M - Mike	T – Tango	
G – Golf	N - November	U - Uniform	

Radio procedures

Number	Pronunciation
0	Zeero
1	Wanna
2	Too
3	Tree
4	Fowa
5	Fifa
6	Six
7	Sevena
8	Eight
9	Nina

HF\VHF\TETRA (UHF)