

## Combat Net Radio Bearer Protocols (MIL-STD-188-220)

### Table of Contents

#### Chapter 1 - Introduction

MIL-STD-188-220  
COMBAT NET RADIO (CNR)  
BASIC PRINCIPLES  
TYPES OF SERVICE  
    Speed of Service (SOS)  
    Speed of Recovery (SOR)  
    Reliability  
MIL-STD-188-220 Data Frame

#### Chapter 2 - OSI7 Layer Model

MIL-STD-188-220 & INTERNATIONAL  
COMMERCIAL STANDARDS  
OSI 7 LAYER MODEL  
DATA FRAME COMPILATION

#### Chapter 3 - Physical Layer

INTRODUCTION  
COMSEC  
    Embedded COMSEC  
    External (Traditional) COMSEC  
    Not Used  
TRANSMISSION MODES  
    Synchronous Mode  
    Asynchronous Mode  
    Packet Mode  
TRANSMISSION FRAME  
    External COMSEC  
    Embedded COMSEC  
    COMSEC Compatibility  
    No COMSEC  
    Transmission Synchronisation  
ROBUST COMMUNICATIONS PROTOCOL  
(RCP)  
FEC & TDC  
NET BUSY INDICATION  
PRIMITIVES  
    Physical Layer Unitdata Request  
    Physical Layer Unitdata Indication  
    Physical Layer Status Indication  
MODEM/RADIO MODULATION SCHEMES  
PHYSICAL LAYER CONCATENATION

#### Chapter 4 - Data Link Layer – Transmission Header

INTRODUCTION  
    Transmission Header

#### Chapter 5 - Data Link Layer – Frames

DATA LINK LAYER FRAMES  
    Unnumbered Frames (U PDUs)  
    Information Frames (I PDUs) 7  
    Supervisory Frames (S PDUs)  
DATA LINK LAYER FRAME COMPOSITION  
    Flag  
    Address  
    Reserved  
    Special Address  
    Unicast  
    Multicast One Hop  
    Group Multicast  
    Global Group Multicast  
    Address Format  
    Single Octet Addressing  
    4 Octet Addressing  
    6 Octet Addressing  
    Use of Multi-Formatted Address Fields  
CONTROL FIELD  
    Control Field Bit Legend  
INFORMATION FIELD  
FRAME CHECK SEQUENCE  
DATA LINK PDU CONSTRUCTION  
DATA LINK CONCATENATION  
PRIMITIVES  
    DL-Unitdata Request  
    DL-Unitdata Indication  
    DL-Status Indication  
    DL-Maximum Data Link Transmission Unit  
(MDLTU) Indication  
    DL-Address Indication  
    DL-Error Indication

#### Chapter 6 - Data Link Layer – Types Of Service

TYPES OF SERVICE  
    Connection Orientated

Connectionless  
 Acknowledged Connectionless  
 TYPE OF SERVICE 1  
 Unnumbered Information (UI) Command  
 Unnumbered Receive Ready (URR)  
 Command  
 Unnumbered Receive Not Ready (URNR)  
 Command  
 Topology Update ID Indication  
 Version CANTPRO Indication  
 TEST Command & Response  
 Flow Control  
 TYPE OF SERVICE 2  
 Asynchronous Balanced Mode  
 Asynchronous Disconnect Mode  
 Sequence Numbers  
 Control Field P/F-bit  
 TOS 2 U PDUs  
 Set Asynchronous Balanced Mode Extended  
 (SABME) Command (Data Link Connection  
 Phase)  
 Disconnect Command (Data Link  
 Disconnection Phase)  
 System Recovery – Reset Command  
 Unnumbered Acknowledgement (UA)  
 Response  
 Frame Reject Response  
 Disconnect Mode Response  
 TOS 2 I PDUs  
 TOS 2 S PDUs  
 TOS 2 Flow Control  
 TYPE OF SERVICE 3  
 TOS 3 U Frames  
 TOS 3 Information Exchange and  
 Acknowledgements  
 Immediate Retransmission  
 TOS 3 Flow Control  
 TYPE OF SERVICE 4  
 TOS 4 U Frames  
 TOS 4 S Frames  
 Decoupled Receive Ready (DRR) Command  
 DRR Response  
 Decoupled Receive Not Ready (DRNR)  
 Command  
 DRNR Response  
 TOS 4 Information Exchange and  
 Acknowledgements  
 TOS 4 Flow Control

DUPLICATE FRAME DETECTION  
 STATION CLASS  
 WHICH TOS?  
 QUIET MODE

## **Chapter 7 - Data Link Layer – Network Access Delay**

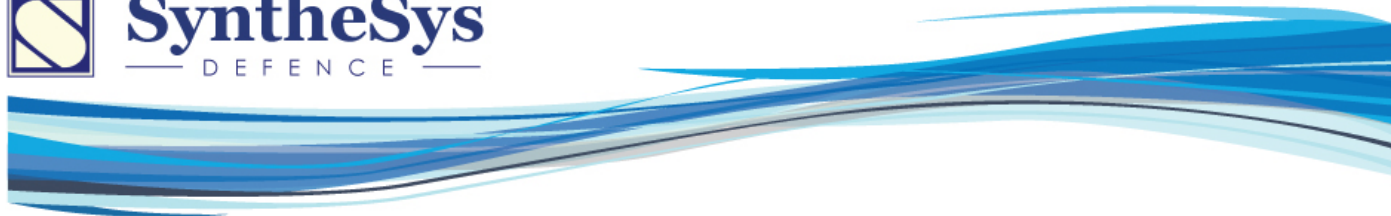
NETWORK ACCESS DELAY  
 Network Busy Sensing  
 Response Hold Delay (RHD)  
 Timeout Period (TP)  
 TP - Immediate Retransmission  
 Network Access Delay (NAD)  
 Random NAD (R-NAD) (Probabilistic)  
 Hybrid NAD (H-NAD) (Probabilistic)  
 Radio Embedded NAD (RE-NAD)  
 (Probabilistic)  
 Prioritised NAD (P-NAD) (Deterministic)  
 Deterministic Adaptable Priority NAD (DAP-  
 NAD) (Deterministic)  
 Data and Voice NAD (DAV-NAD)  
 (Deterministic)  
 Frequency of Access Ranking (FOAR)  
 Initial Condition State

## **Chapter 8 - Timing & Associated Parameters**

INTRODUCTION  
 Equipment Preamble Time (EPRE)  
 Phasing Transmission Time (PHASING)  
 Data Transmission Time (DATA)  
 Coupled Ack Transmission Time (S)  
 Equipment Lag Time (ELAG)  
 Turnaround Time (TURN)  
 DTE Ack Preparation Time (DTEACK)  
 DTE Processing Time (DTEPROC)  
 DTE Turnaround Time (DTETURN)  
 Tolerance Time (TOL)  
 Maximum Transmit Time (MTT)

## **Chapter 9 - Exchange Network Parameters**

EXCHANGE NETWORK PARAMETERS (XNP)  
 Network Control Station (NCS)  
 XNP Messages  
 Join Request  
 Join Accept  
 Join Reject  
 Hello  
 Goodbye



Parameter Update Request  
Parameter Update Message  
Status Notification Message  
NCS Handover  
NCS Handover Request  
NCS Accept/Reject  
NCS Election  
Participant Information Request  
Participant Information  
CANTPRO Indication  
Participant States  
Un-Joined State  
Joining State  
Joined State

LIST OF ACRONYMS  
INDEX

## **Chapter 10 - Network Layer**

### INTRODUCTION

Intranet Header  
Source Directed Relay Address Processing

### TOPOLOGY UPDATE

Routing Tree

### PRIMITIVES

### INTERNET PROTOCOL (IP)

Subnetwork Dependent Convergence  
Function (SNDCF)  
N-Layer Pass-Through

## **Chapter 11 - Transport Layer**

### INTRODUCTION

Transmission Control Protocol (TCP)  
User Datagram Protocol (UDP)  
Segmentation Reassembly (S/R)

## **Chapter 12 - Hardware**

### INTRODUCTION

MIL-STD-188-220 COMPLIANT RADIO TYPES  
SINGARS ICOM CNR  
SINGARS System Improvement  
Programme (SIP) CNR  
SINGARS ASIP/Advanced Data Radio (ADR)  
CNR  
UHF - Single Frequency and HAVEQUICK II  
SATCOM  
MIL-STD-188-220 Data Modems  
Internet Controller (INC)  
The Improved Data Modem (IDM)  
Tadiran Tacter Terminals