



DIMETRA APPLICATION PROGRAMMING INTERFACE (API) TRAINING

Dimetra Data Services API
PDS





Welcome!

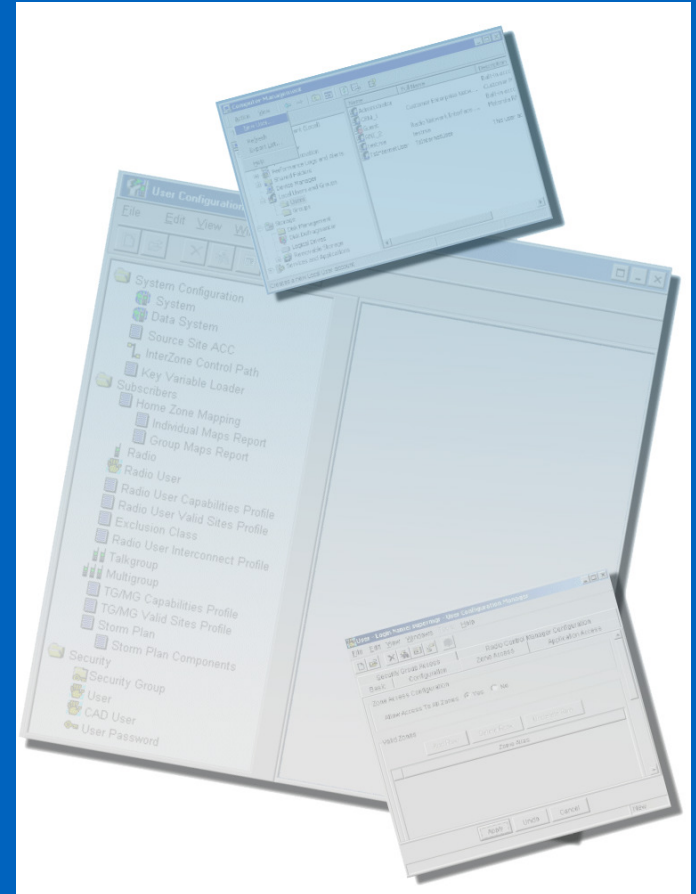
- **Introduction (instructor)**
- **Introduction (attendees)**





Course Structure

- Module 1 - Course Introduction**
- Module 2 – Dimetra Data Service Overview**
- Module 3 – Packet Data Service**
- Module 4 – PDS Access Methods**
- Module 5 - Course Summary**





Dimetra Data Service Overview

Overview



Dimetra offers two data services

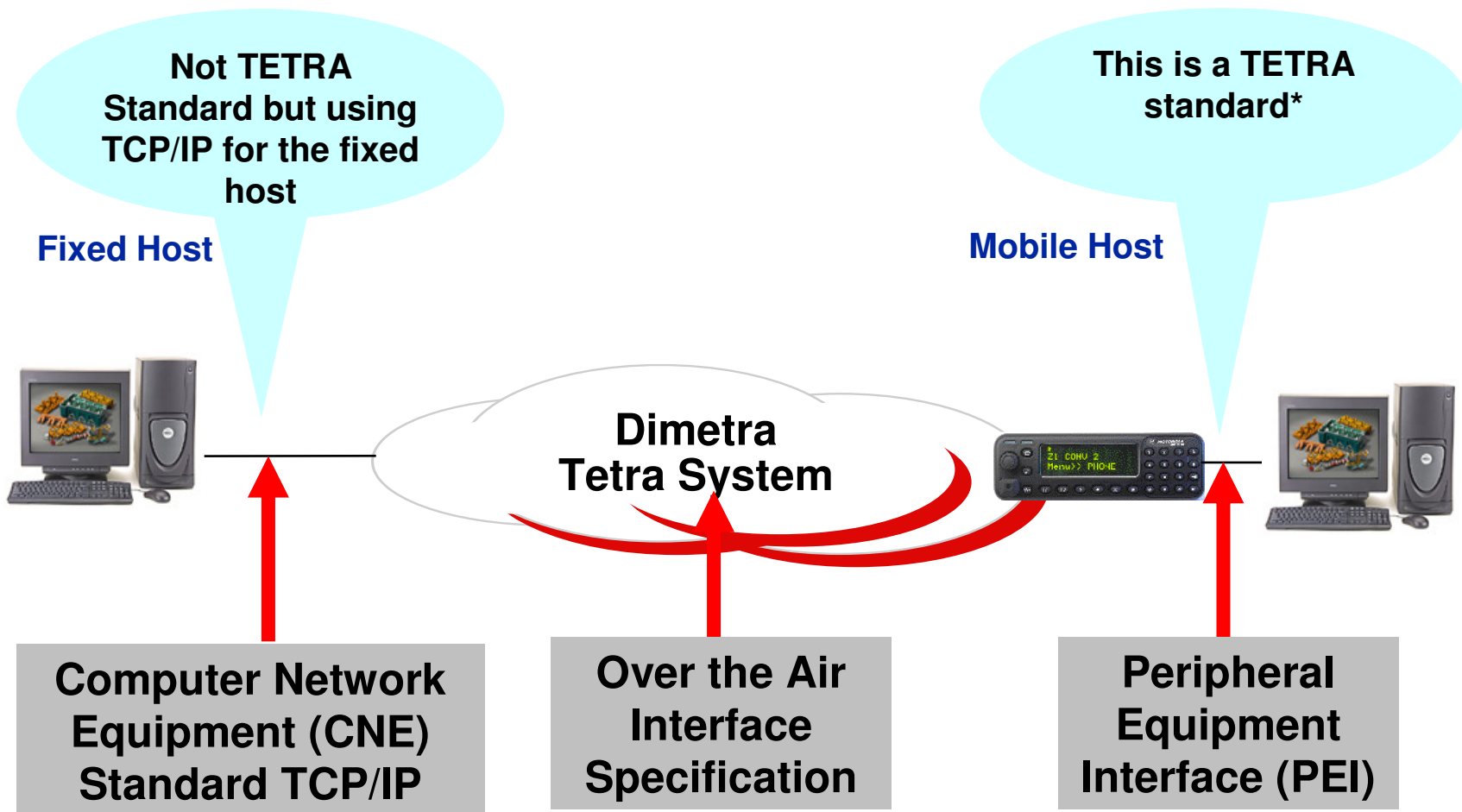
- Short Data Transport Service (SDTS)
- Packet Data Service (PDS)

Uses TETRA AIR link to send data from a data server over the Dimetra Infrastructure to/from a subscriber or between two subscribers

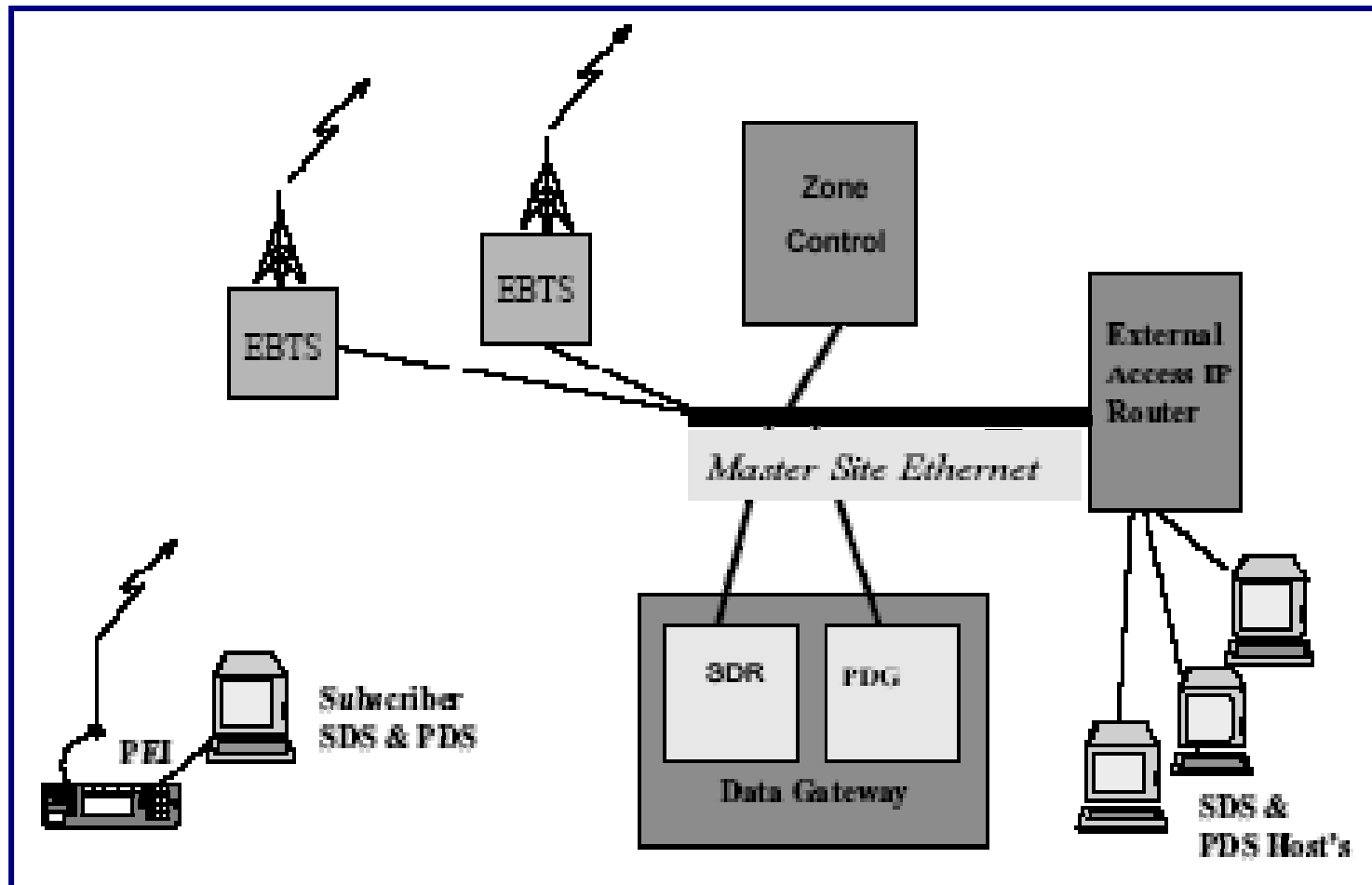
Both services supported by Dimetra Data Gateway

- Short Data Router (SDR) for SDTS
- Packet Data Gateway (PDG) for PDS

How to Access Data Services



Dimetra Data Architecture





Packet Data Service

Packet Data Service Overview



Service that is provided on the dedicated channel called Packet Data Channel (PDCH)

Uses TETRA Sub Net Dependent Convergence Protocol (SND CP) over the air interface

Allows several users to share the same Packet Data Channel simultaneously

IPv4 Implementation on top of TETRA PDS

PDS does not work concurrent with voice service

New release having TEDS* capable

Packet Data Service Overview (cont)



Point to point transferring of large amount of data

Recommended transport protocol for PDS is the User Datagram Protocol (UDP)

Service can be accessed on two different access points:-

- Peripheral Equipment Interface (PEI) in the mobile
- Computer Network Equipment (CNE) on the LAN

PEI

- a standardized RS232 connection to the mobile

CNE

- an IP interface to PDG

Sample Applications



Automatic vehicle location

Messaging (UDP sender/receiver)

Database inquiry (from server at MSO Network)

File transferring (FTP, TFTP)

Benefits of PDS



Provides a relatively high performance data service compared to SDTS

Provides a connectivity that is standardised internet connectivity (IP)

Optimal use of the radio channel because more users can share it

PDS Operation



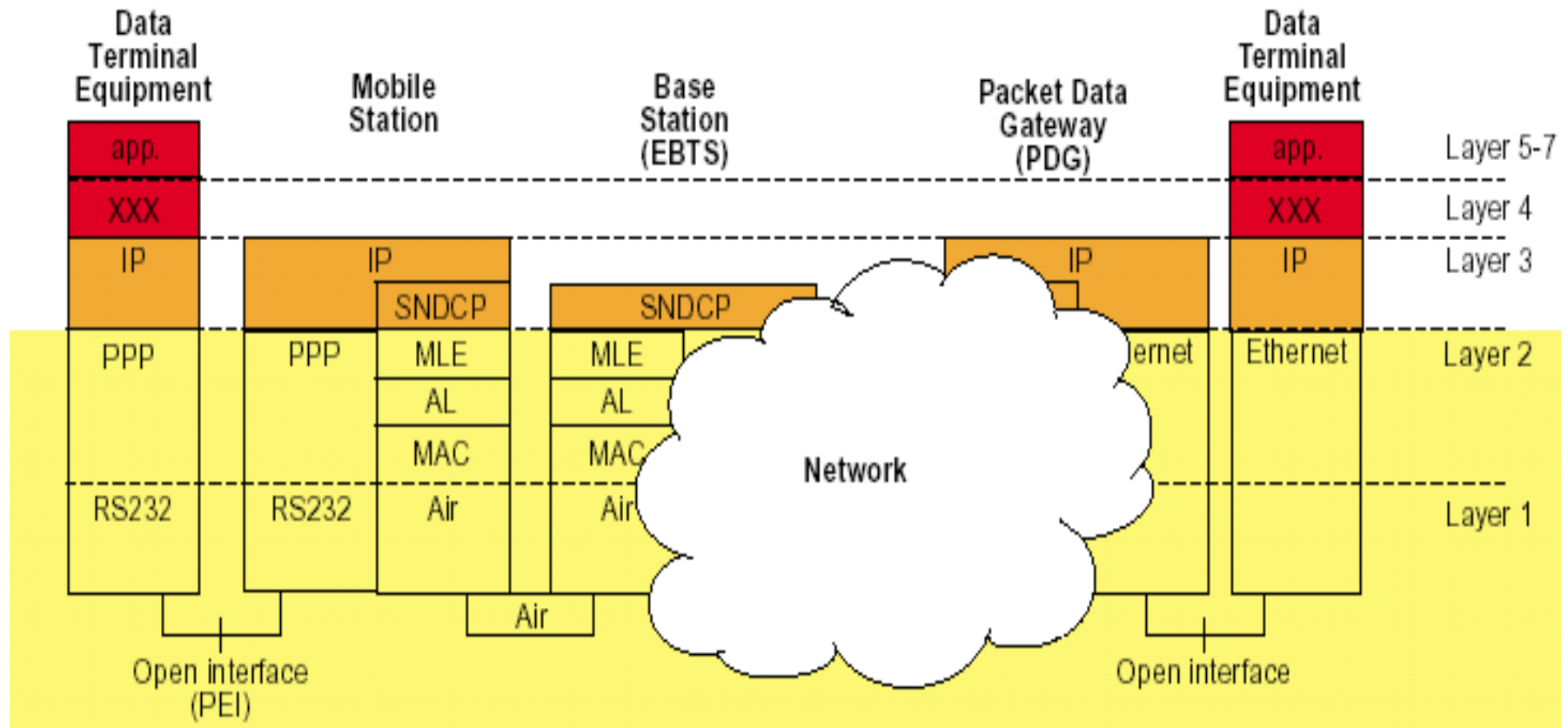
Supported by Packet Data Gateway (PDG) for routing IP datagrams to destination

IP datagrams delivered via air interface using SMDCP to PDG

PDG forwards the datagram to appropriate EBTS to deliver to the destination of the MS

PDG also forwards datagram to host using IP if datagram is to be delivered to external PDS host

PDS Protocol Stack



Address Assignment



IP address are managed in system and assigned to MS where specific ISSI is provisioned with a specific IP address

Host connected to MS uses IP address in the mobile subnet

Two ways of addressing the IP address

- Static Addressing
- Dynamic Addressing

Address Assignment (cont)



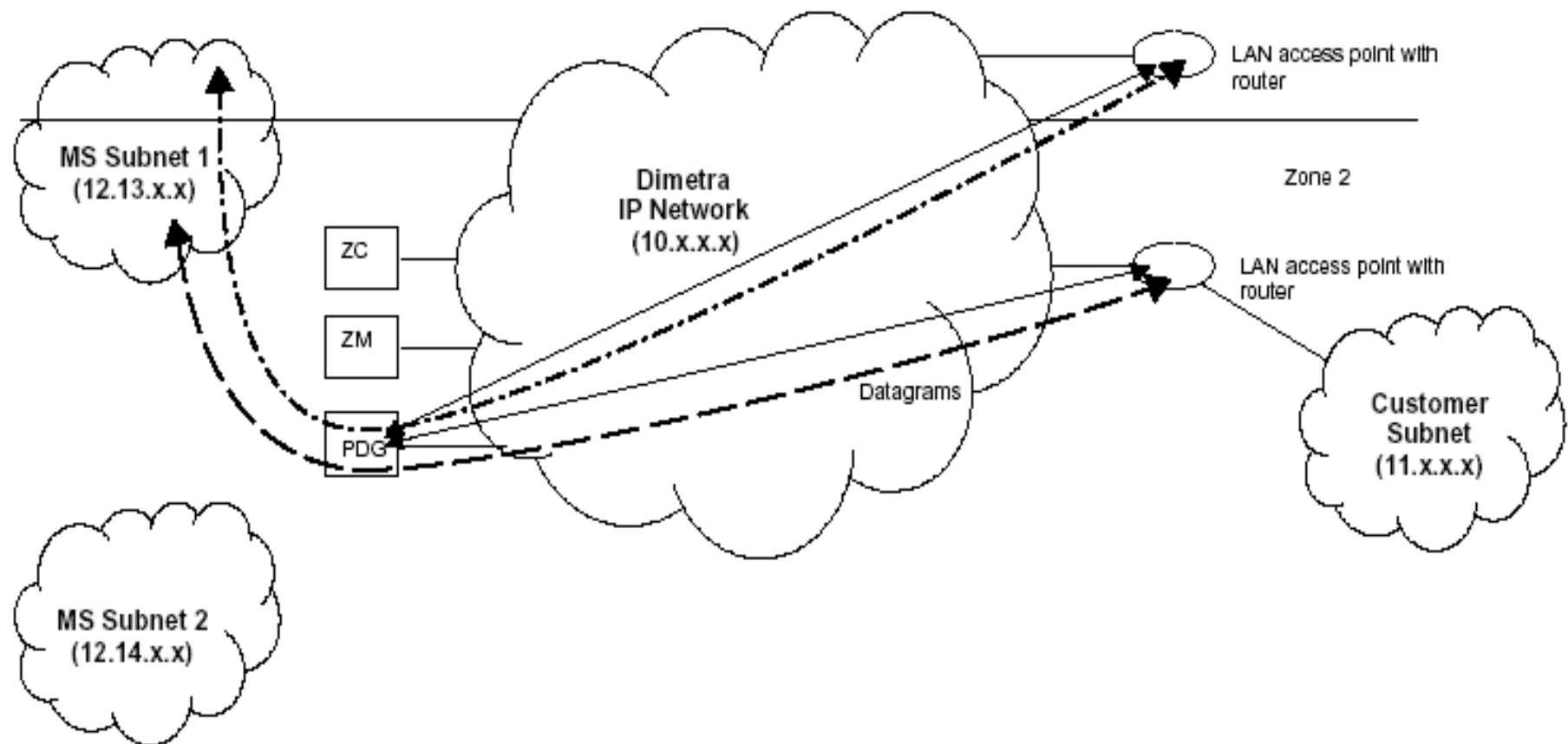
Static Addressing

- Host connected to MS is configured with the IP address and configured to request that address to be used when it connects to MS. SwMI will give permission to use the address if it matches the provisioned address

Dynamic Addressing

- Host connected to MS is configured to obtain IP address from SwMI, where it will extract the provisioned address and hand the address to the MS
- Obtain an address by use of DHCP server in the customer network

Network Topology



PDS Communication Protocol



Transferring files can be in TCP/IP protocol communication or UDP protocol communication

Connection between client and server needs to be established before TCP/IP protocol can be used but not for UDP

File Transfer Protocol (FTP) application is used for TCP/IP protocol communication while Trivial File Transfer Protocol (TFTP) is used for UDP protocol communication

PDS Communication Protocol (cont)



UDP protocol communication is recommended for PDS because programmers have full control of it

UDP protocol does not have flow control and it provides faster transmission

TCP may not be byte efficient – larger overhead



PDS Access Methods



PDS PEI Access Point



Introduction

Purpose is to transport IP datagram's between MT and connected TE

A complex interface that makes use of several support protocols

RS 232 Connection

- The RS 232 Connection is similar to what was explained in SDTS

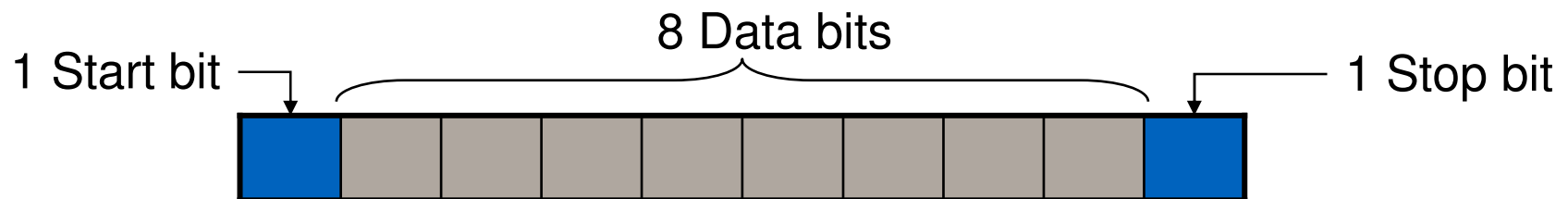
AT Command

- Supported AT commands are similar to what was explained in SDTS but with one difference. AT commands used in PDS is mainly to switch the MS into Point-to-Point Protocol (PPP) mode

RS 232 Connection



**A standardized RS 232 connection to the mobile
8-wires connection with TXD,RXD,DTR,CTS and RTS
TXD and RXD to carry data between MS and TE at baud
rate 9600bps, 1 start bit, 8 data bits and 1 stop bit.**



**CTS and RTS are for the flow control
DSR, DTR and DCD are used for state management**

Protocol Involved



IPCP	IP Configuration Protocol, RFC 1332
PAP/CHAP	PPP Authentication Protocols, RFC 1334
PPP	Point to Point Protocol, RFC 1661, RFC 1662
AT	TETRA enhanced AT protocol, ETS 300 392-5. ITU-T v.25ter
RS232/V.24	ITU-T v.24, v.28



Switching to PPP Mode

Default mode for MS is AT Command mode

MS needs to be switched to PPP mode

Switching from AT to PPP mode required simply the AT dial command

```
Request:  ATD<CR>
Response: <CR><LF>CARRIER 7200<CR><LF>
          <CR><LF>PROTOCOL:ALT<CR><LF>
          <CR><LF>COMPRESSION:NONE<CR><LF>
          <CR><LF>CONNECT<CR><LF>
```

PPP Link Establishment



PPP Link Configuration Protocol LCP
Based on RFC 1661

IP Configuration Protocol (IPCP)

- to negotiate IP related settings
- PD registration

IP Mode

- PD registered
- ready for transmit and receive data

Deregister And Switch Back To AT Command Mode



Deregistering and switching back to AT command mode can be done :-

- Temporarily clear DTR
- Send LCP Terminate-Req
- Send IPCP Terminate-Req
 - (initiate by TE)

Termination by MS when:-

- PD registration with SwMI is lost
- MS is put to “voice mode”, DMO mode, or TXI mode



PDS CNE Access Point

Introduction



Access point is on Ethernet based interface

Access point will connect to the Dimetra LAN

The interface will support standard routing protocols

Summary of Protocol Definitions



PPP, LCP, IPCP

- a standard method for transporting multi-protocol datagrams over point-to-point links

ICMP

- messages generated on delivery failure. Which ICMP message is generated depends on the cause of the non-delivery

Detail information on PPP, LCP, IPCP and ICMP can be referred to Packet Data Programmer's Guide available in Motorola Online



MISC discussion

Packet Data Service Setup



Modem setup

- Radio will act as the modem to connect to the Dimetra network
- Baud rate settings much match between terminal equipment and radio

Dialup PDS

Ping own IP (eg. 10.8.6.x)

Ping radio IP (eg. 10.8.6.x)

Ping CEN network IP (eg. 192.168.1.x)

Comparison between Dimetra MS and Normal Modem



Dimetra MS	Modem
Provides entire packet switched for NAS, PDG and MS communication	Provides Network Access Server (NAS)
If no data being sent, no bandwidth consumed	
If no tear down of the communication with NAS (PDG), MS/TE remains connected	
MS/TE remains addressable	
PPP link is terminated in the MS. IP datagram is re-packed in TETRA protocol, optimized for radio communication, so, 1) radio link layer failure may cause lost IP datagrams – not dial up calls. 2) sessions can stay alive even if the radio temporarily moves out of coverage. 3) IP datagrams lost on the radio link layer reported lost as ICMP	PPP link from the host is terminated in the NAS, modem carries PPP transparently

Application Behaviour



No storage for packet not delivered

Dimetra Network will drop the packet and send an ICMP packet to originator

Receiving “host unreachable”, application should stop sending for awhile

Application should responsible in handling the PDS session



Summary

Summary



Packet Data Service in Motorola Dimetra implementation is using SNDCP and terminated at the IP Protocol

There are 2 servers for PDS

- GGSN (gateway from Dimetra system to customer network)
- PDR (dimeta system component handling PDS)

Two ways to get the PDS from Dimetra system

- PEI
- CNE

After modem setup and dialup to Dimetra System, it is up to the application level to use the PDS provided

THANK YOU...



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