Product Introduction

Software Option Version

MD8480C
W-CDMA Signalling Tester

MD8480C W-CDMA Signalling Tester Product Introduction (Software Option Version)

Ver. 9.00

Anritsu Corporation

Anritsu envision : ensure

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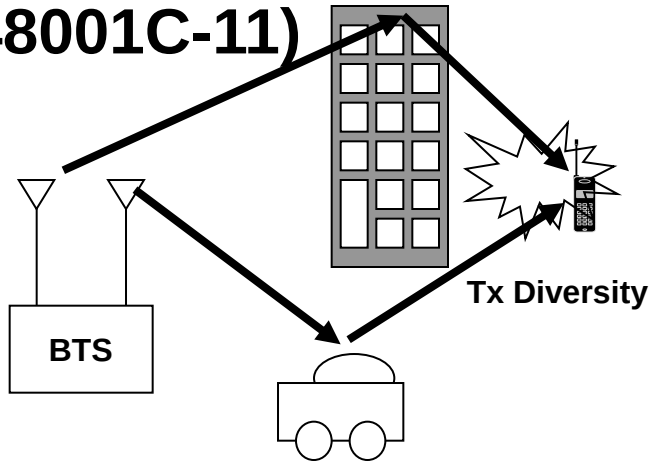
W-CDMA (1/14)

- Tx Diversity (MX848001A-01, MX848001C-11)
  - What is Tx Diversity?
    - Tx Diversity is a transmission method to improve reception sensitivity at the receiver side by transmitting signals from two separate antennas at some distance from each other.

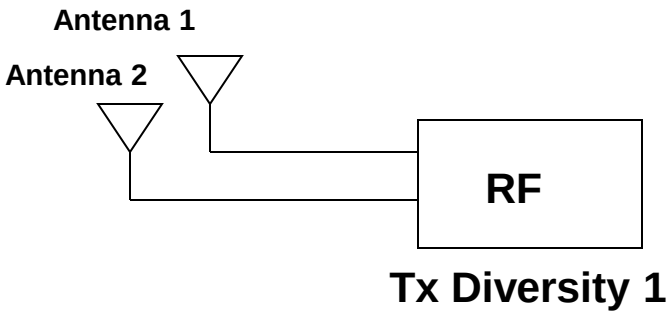


Although the received signal suffers interference, the reception quality is improved by combining or selecting signals from two antennas.

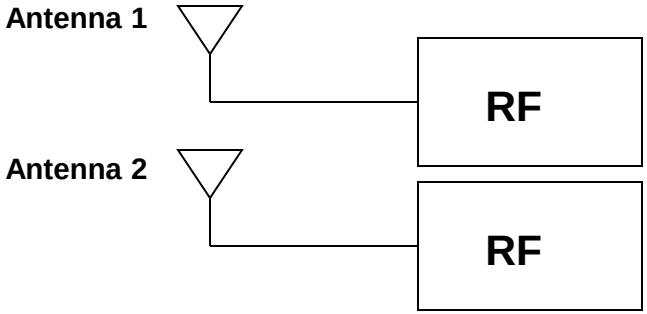
  - Diversity Technology
    - Radio waves used by mobiles suffer from blocking, reflection, and scattering effects due to the presence of obstacles and reflective objects, such as buildings, trees, and geographic features in the transmission path. As a result, radio waves following different paths can interfere with each other, causing the level of the radio wave to vary. This phenomenon is called fading.
    - Diversity technology is used to improve fading, thereby assuring high-quality, high-reliability transmissions.

W-CDMA (2/14)

- Tx Diversity (MX848001A-01, MX848001C-11)
  - Supported Methods
    - TSTD (Time Switched Transmit Diversity)
    - STTD (Space Time Transmit Diversity)
    - Closed Loop Mode 1
    - Closed Loop Mode 2
  - RF Output
    - Maximum 2*1



Tx Diversity 1

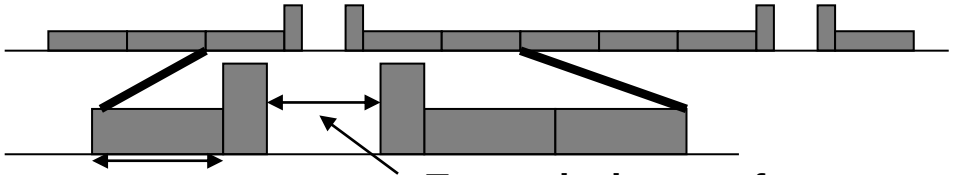


Tx Diversity 2*1

*1: Requires MD8480C-04 Additional RF Unit 2

W-CDMA (3/14)

- Compressed Mode (MX848001A-02)
  - What is Compressed Mode?
    - The Compressed Mode is used to create time to monitor cells on other frequencies during communications. To monitor during communications, the communications data is compressed and wireless frames are time-divided to switch usage between normal communications and monitoring*1.



Outline of Compressed Mode

  - Supported Methods
    - SF/2 (Multi TGP, Single TGP)
    - Puncturing
    - Higher Layer Scheduling

*1: Refer to 3GPP TS25.211 to TS25.215 for details.

W-CDMA (4/14)

- Message Encoder/Decoder (MX848001A-07)
  - What is Message Encoder/Decoder?
    - This option provides a protocol message encoder/decoder library supporting RRC, NAS (RR, CC, MM, GMM, SM), SMS, and SS (Supplementary Service).
  - What is It Used For?
    - To change or extract message information elements in scenarios
    - To perform scenario conditional branch processing and received-message analysis
  - What are the Advantages?
    - Simplified scenario development
    - Efficient scenario management

W-CDMA (5/14)

- Message Encoder/Decoder (MX848001A-07)
  - How Is It Used? (RRC Connection Request Example)

```
{
  INT   UeIdType;
  UCHAR UeId[256];

  /* Receive Message: RRC Connection Request */
  {
    INT BtsNo;
    INT Frame;
    INT Lo_Ch;
    INT Lo_No;
    INT ret;

    SequenceDisp( " wait 'RRC Connection Request'" );
    for( ;; ){
      ret = IntegrityRcvMessage( &BtsNo, &Frame, &Lo_
      if( ( Frame == RLC_TR_DATA_IND ) && ( Lo_Ch =
          ( GetMessageTypeMsgNo( U_CCCH, RcvData
        {
          UCHAR buff[16];
          /* Get UeId Type */
          ExtractIE( RcvData, buff, 5, 3 );
          UeIdType = Msb2IntIE( buff, 3 );

          /* Get UeId */
          if (UeIdType == 0) {        /* IMSI */
            ExtractIE( RcvData, UeId, 8, 64 );
          }
          else if (UeIdType == 1) {   /* TMSI */
            ExtractIE( RcvData, buff, 8, 69 );
          }
          else if( UeIdType == 2 ) {  /* P_TMSI */
            ExtractIE( RcvData, buff, 8, 77 );
          }
          else {
            SequenceDisp("Unknown UE-ID type");
          };
        }
        break;
      };
    };
  };
```

Unable to decode ASN.1, so extract the 'initialUE-Identity' Information by specifying position of bit with information elements.
In this example, bit 5 to bit 3 of the received-message header are obtained as the UE-ID Type. Since the UEID value is different from the UE-ID Type obtained using the bit position, the processing is branched, making it necessary to describe the processing for acquiring each UE-ID.

Sample scenario when NOT USING this option

```
{
  INT   UeIdLength;
  UCHAR UeId[256];

  /* Receive Message: RRC Connection Request */
  {
    INT BtsNo;
    INT Frame;
    INT Lo_Ch;
    INT Lo_No;
    INT ret;

    SequenceDisp( " wait 'RRC Connection Request'" );
    for( ;; ){
      ret = IntegrityRcvMessage( &BtsNo, &Frame, &Lo_Ch, &Lo_No, RcvData, NO_TIMEOUT );
      if( ( Frame == RLC_TR_DATA_IND ) && ( Lo_Ch == U_CCCH ) &&
          ( GetMessageTypeMsgNo( U_CCCH, RcvData ) == Jun2001_RrcConnectionRequest ) ) {

        UeIdLength = AsnGetValue( AsnHandle, RcvData, sizeof(RcvData),
          "UL-CCCH-Message.message.rrcConnectionRequest.initialUE-Identity",
          UeId, sizeof(UeId), CODER_OPT_ARRAY | CODER_OPT_BRANCH | CODER_OPT_BITLEN);
```

The 'initialUE-Identity' Information can be acquired by specifying the path. In this example, the 'initialUE-Identity' Information is acquired as information included up to the sub-tree.
The information can be acquired without knowing the actual bit position by specifying the path as a character string.

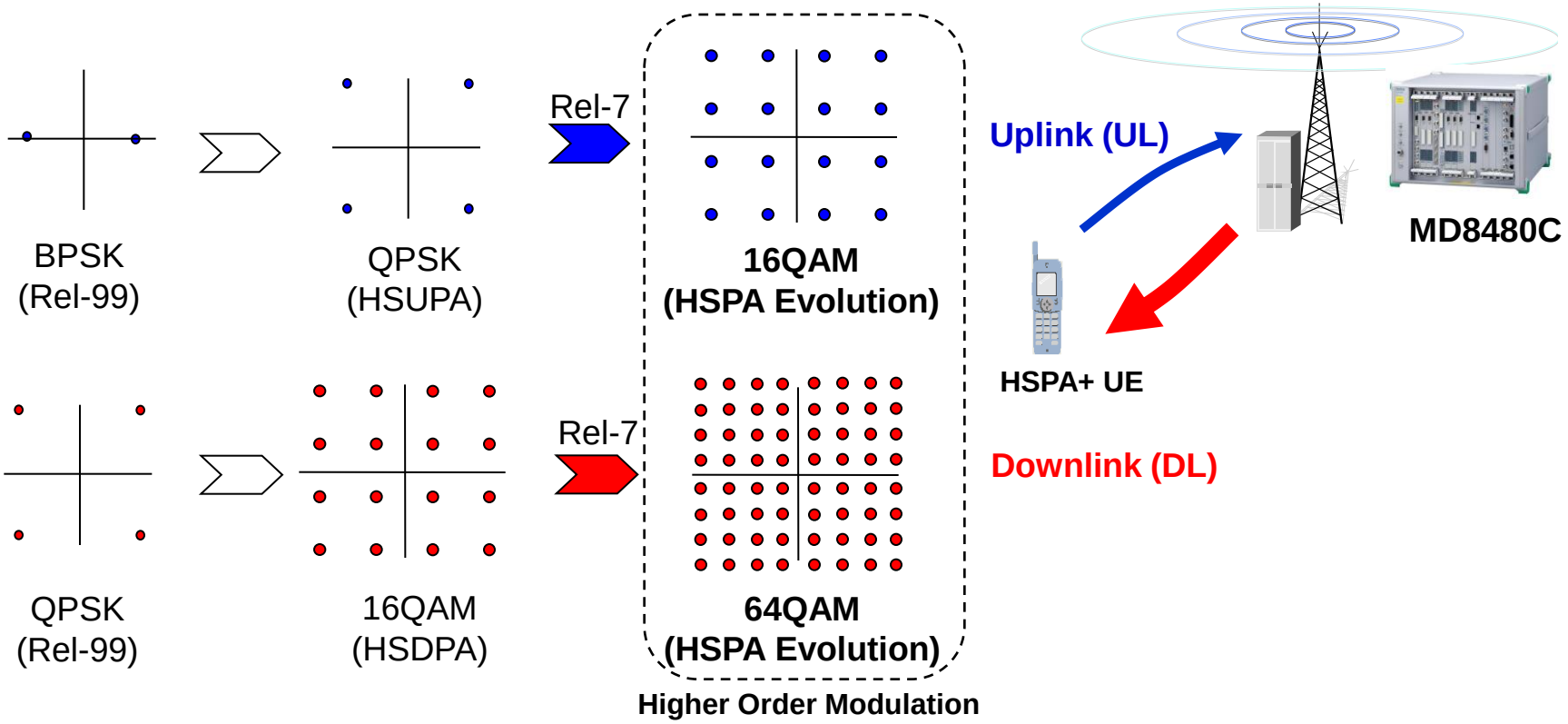
Sample scenario when USING this option

W-CDMA (6/14)

- HSPA Evolution (Release 7) (MX848001C-12)
  - This option supports the following Release 7 functions:
    - CPC (Continuous Packet Connectivity)
      - UL DTX – To Reduce Uplink Overhead
      - DL DRX – To Reduce UE Power Consumption
      - HS-SCCH Less Mode – To Reduce Downlink Overhead
      - Enhanced F-DPCH, Uplink Slot Format 4, etc.
    - Enhanced Cell FACH
      - Function for using HS-DSCH at CELL_DCH as well as at CELL_FACH, CELL_PCH, and URA_PCH
    - CS Voice over HSPA
      - Voice communication service using channel DL_HS-DSCH and UL_E-DCH of HSDPA/HSUPA
    - MAC-ehs
      - Enhanced MAC-hs function supporting new Tx power control and modulation scheme

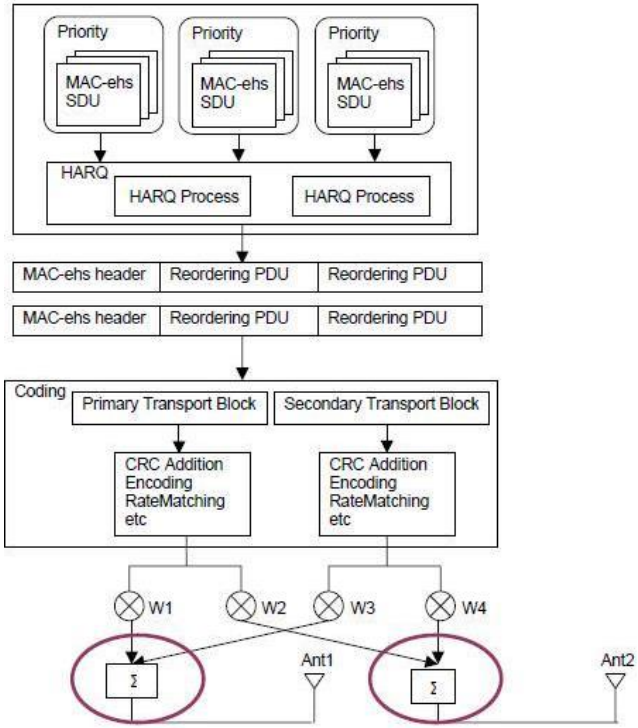
W-CDMA (7/14)

- Higher-Order Modulation (MX848001E-13)
  - Supports new modulation scheme DL 64QAM and UL 16QAM added by Release 7



W-CDMA (8/14)

- 2x2 MIMO (MX848001E-14)
  - 2x2 MIMO functionality added by Release 7
  - Doubled transmission speed by splitting Tx data into two streams and sending each stream simultaneously using multiple antennas
  - Supports:
    - Retransmission Control
    - Single and Dual Stream
    - Stream Schedule Function for Testing



MD8480C MIMO Operation Concept

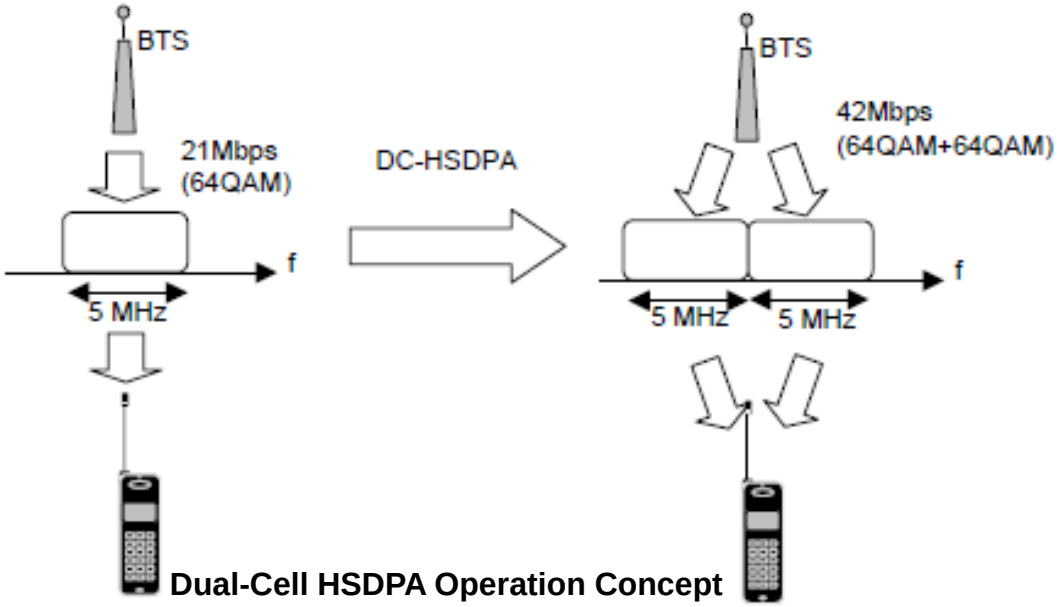
W-CDMA (9/14)

- HSPA Evolution for UL (Release 8) (MX848001E-15)
  - Enhancements for uplink (UL) channel added by Release 8
  - Used to increase cell capacity under continuous packet connection and save the UE battery consumption
  - Supports:
    - Improved Layer 2 for Uplink
    - Enhanced UL for CELL_FACH state
  - HS-DSCH Serving Cell Change Enhancement (Release 8) also added by this option*1

*1: Requires FW V7.30 or later version

W-CDMA (10/14)

- DC-HSDPA (Release 8) (MX848001E-16)*1
  - New functionality Dual-Cell HSDPA added by Release 8
  - Supports maximum download speed 42 Mbps with dual cells using doubled bandwidth (5 MHz x 2) of HSDPA



Dual-Cell HSDPA Operation Concept

*1: Supports dual-cell with adjacent carrier.

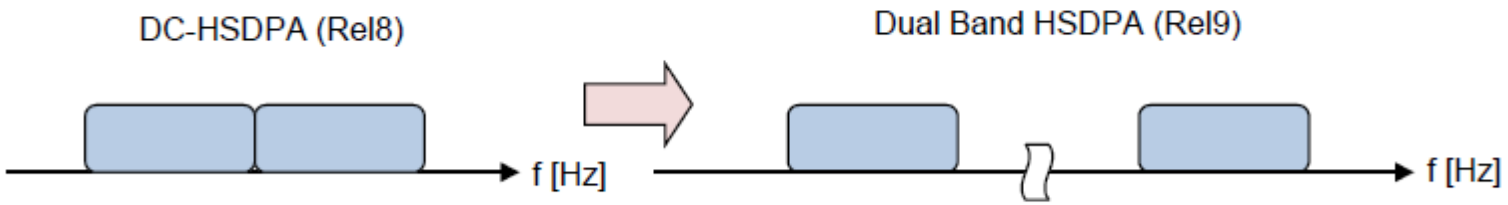
W-CDMA (11/14)

- 64QAM and MIMO for HSDPA (MX848001E-17)*1
  - New functionality 64QAM + MIMO added by Release 8
  - Supports maximum download speed 42 Mbps with 64QAM using 2x2 MIMO (Dual-antenna) of HSDPA

*1: Requires FW V7.30 or later version

W-CDMA (12/14)

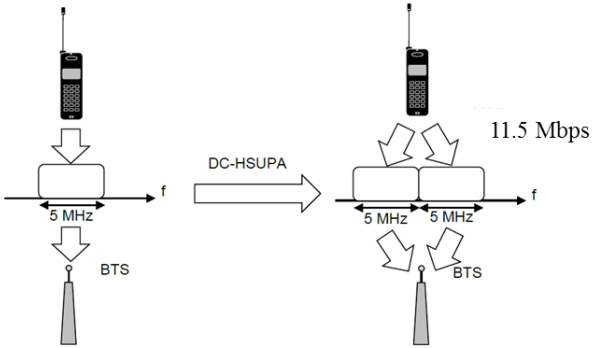
- DB-DC-HSDPA (Release 9) (MX848001E-18)
  - New functionality Different Bands for Dual Cell(DB-DC) HSDPA added by Release 9
  - While the DC-HSDPA function is used for frequencies in the same band, the DB-DC-HSDPA function is useful for telecoms with multiple frequency bands where each carrier is transmitted in a different frequency band, achieving a max. data packet DL speed of 42 Mbps.



DB-DC-HSDPA Operation Concept

W-CDMA (13/14)

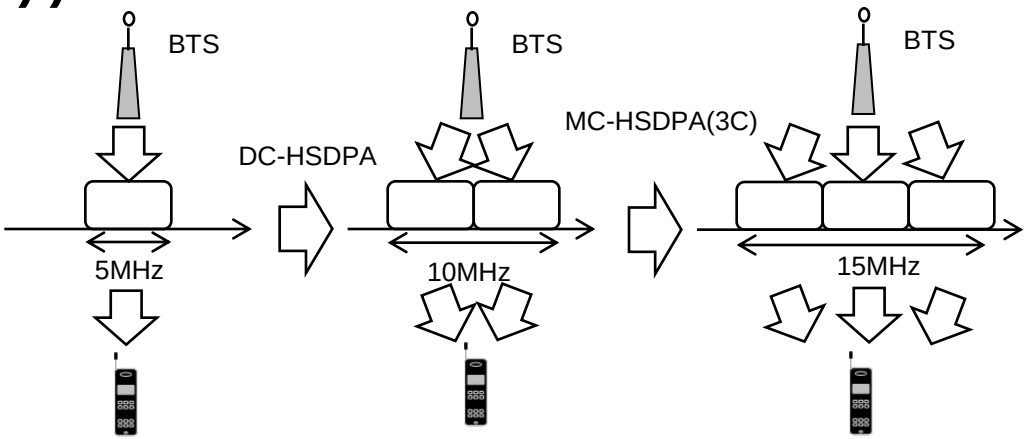
- **DC-HSUPA (Release 9) (MX848001E-20)**
  - **New functionality Dual Cell(DC) HSUPA added by Release 9**
  - **DC-HSUPA is capable of receiving UL data to be paired DC-HSDPA. It is a new technology achieving higher packet communications by doubled frequency bandwidth (5 MHz x 2) of existing HSUPA channel. It supports maximum data throughput 11.5Mbps (Category 8) in UL (L1 supports Category 9).**



DC-HSUPA
Operation Concept

W-CDMA (14/14)

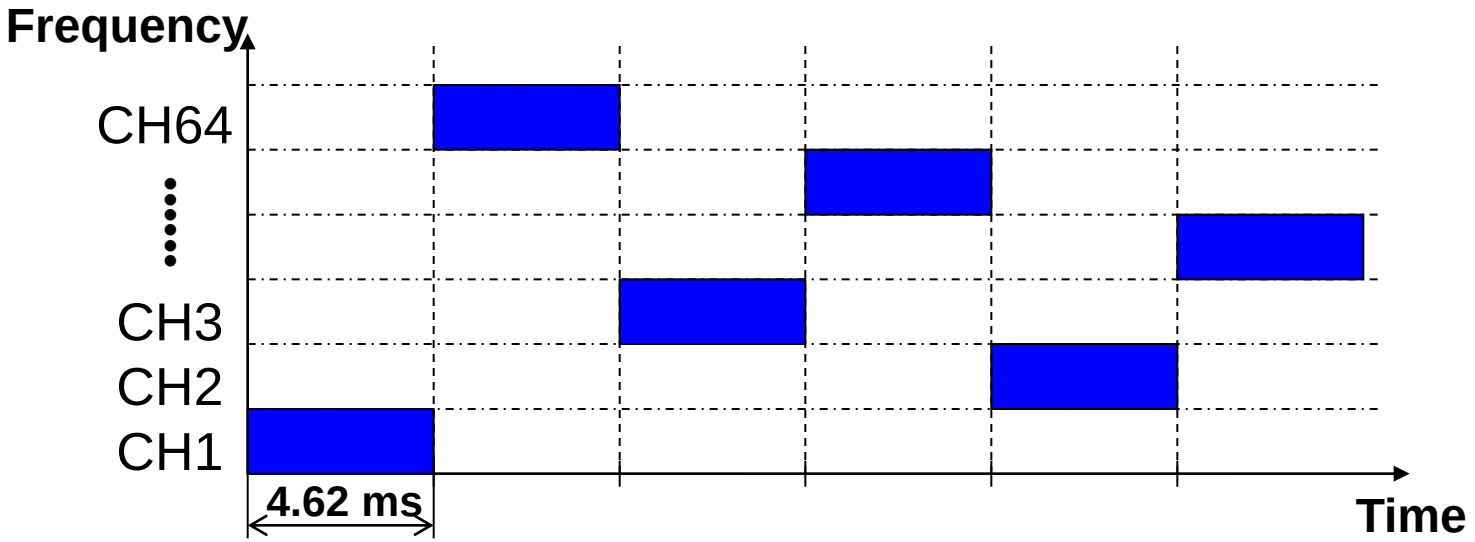
- **MC-HSDPA (Release 10) (MX848001E-21)**
  - **New functionality Multi Carrier(MC) HSDPA added by Release 10**
  - **MC-HSDPA is a new technology achieving higher packet communications by triple frequency bandwidth(5 MHz x 3) of existing HSDPA. It supports data throughput 41.2 Mbps of 16QAM in DL (L1 supports Category 29 of DL 63.3 Mbps (64QAM)).**



MC-HSDPA
Operation Concept

GSM (1/2)

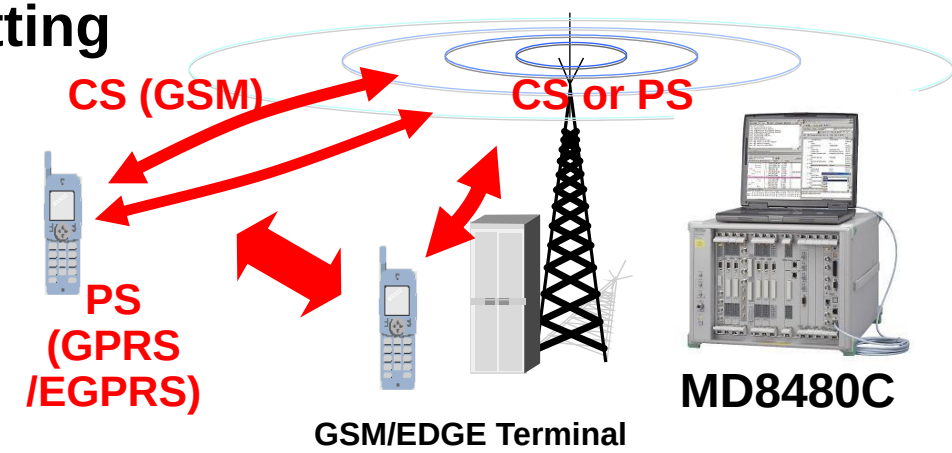
- GSM Frequency Hopping (MX848001A-05)
  - What is GSM Frequency Hopping?
    - This function switches the communications frequency at a frame cycle of 4.62 ms (hopping) to a frequency determined by a frequency selection algorithm found from a frequency hopping list*1.



*1: List of frequencies for frequency hopping. Input parameters based on this list. List set to any setting using scenario.

GSM (2/2)

- DTM (MX848001C-30)
  - What is DTM?
    - This function supports simultaneous connection (Dual Transfer Mode) of voice (CS: Circuit Switch) and data (PS: Packet Switch) used by GSM/EDGE networks
  - CS/PS Frequency
    - Same frequency as CS and PS
  - Transmission Power Setting
    - Separate CS/PS
  - DTM Multislot Class
    - Multislot Class 5, 9, 11
  - Signalling Procedure
    - CS ⇔ CS + PS
    - PS ⇔ CS + PS
  - EGPRS
    - Voice (CS) + EGPRS packet (PS)



Common (1/5)

- Ciphering (MX848041E/41E-10, MX848045C)
  - What is Ciphering?
    - This option adds a ciphering function to the signalling tester and supports 3GPP-compliant ciphering algorithms.
  - Supported Methods
    - W-CDMA: 3GPP TS.33.102
      Ciphering Type: UEA1 (KASUMI), UEA2 (SNOW 3G)
    - GSM: 3GPP TS03.20
      Ciphering Type: A5/1, A5/2, A5/3
    - GPRS: 3GPP TS04.64
      Ciphering Type: GEA1, GEA2, GEA3

Common (2/5)

- Router Connection (MX848001A-03)
  - Router Connection Function
    - This option adds Subnet Mask and Default Gateway functions to the MD8480C LAN interface, permitting sending of packets to a different subnet than the router*1.
    - This is useful for testing connections to multiple application servers and for accessing test servers on a company intranet*2.

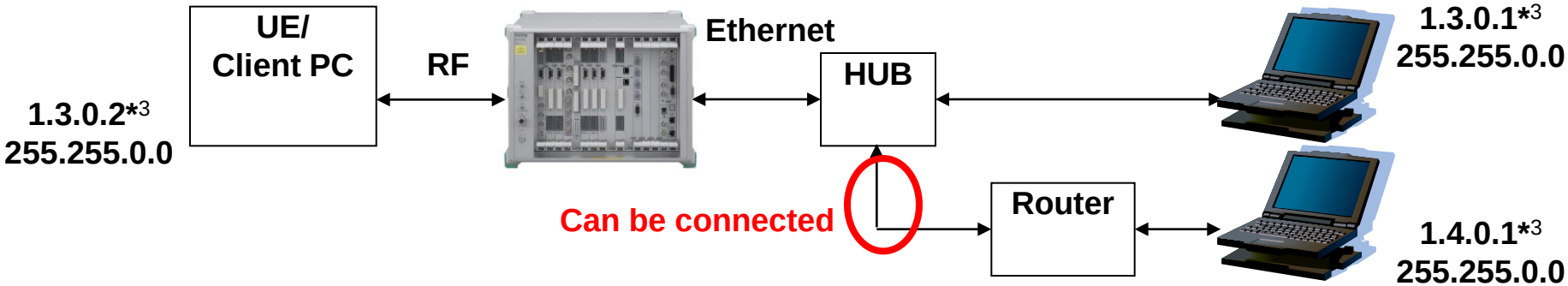


Fig. 1. Packet Communications Diagram after Adding Function

*1: Can use both PPP packets (built-in server) and IP packets
*2: Anritsu has tested this function in-house but cannot guarantee that it will always work as expected due to the different MD8480C PC server and LAN connection environments.
*3: The IP address and subnet mask are only examples and any values can be set by the scenario.

Common (3/5)

- Router Connection (MX848001A-03)
  - Robust Header Compression (RoHC, RFC3095)
    - Robust compression method to avoid packet loss
      - Adds Compressor and Decompressor functions to MD8480C PDCP layer
      - Supports End-to-End Function and Protocol tests between UE and test server

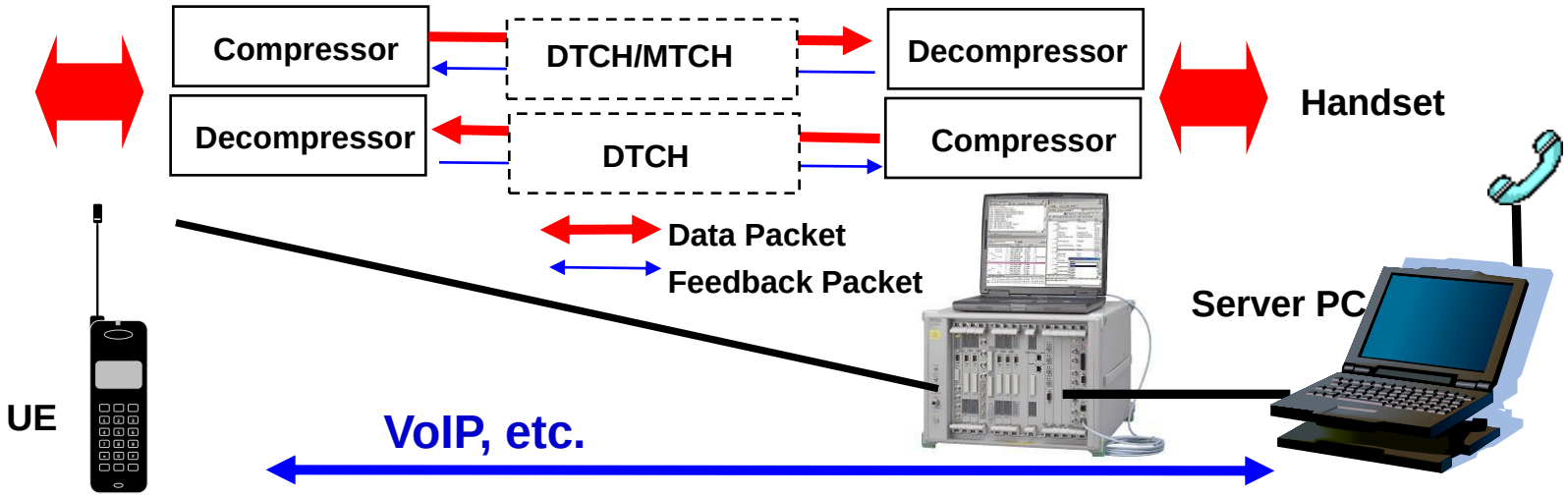


Fig. 2. Test Example of Voice over IP (VoIP) Communication using RoHC

Common (4/5)

- GSM CSD (MX848001A-04)
- W-CDMA CSD (MX848001A-06)
  - What is CSD?
    - This function supports Circuit Switched Data (CSD) used by GSM and W-CDMA.

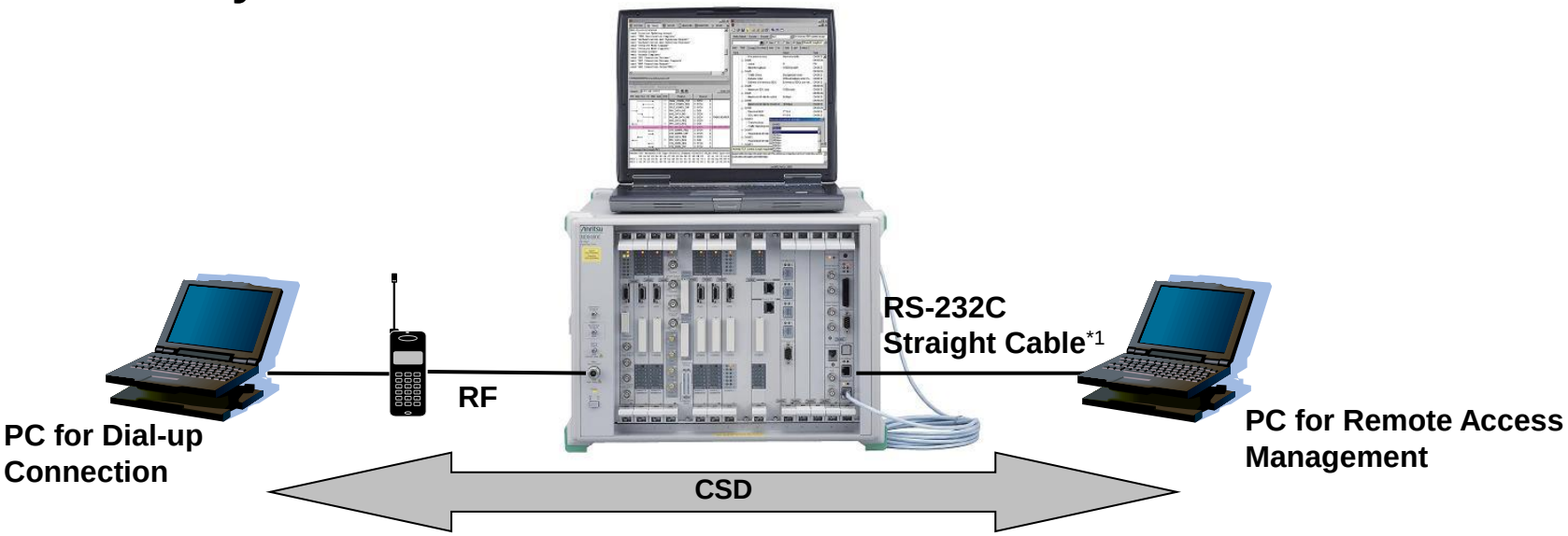


Fig. 3. Setup using CSD Function

*1: The CSD test requires the ISDN/CSD (MU848055C) unit.

Common (5/5)

- GSM CSD (MX848001A-04)
- W-CDMA CSD (MX848001A-06)
  - Supported Data: PPP (Point to Point Protocol)
  - Supported Rates: 9.6, 14.4, 28.8, 57.6 kbps (HSCSD)
  - Supported Modes: Asynchronous mode data transmission in non-transparent mode

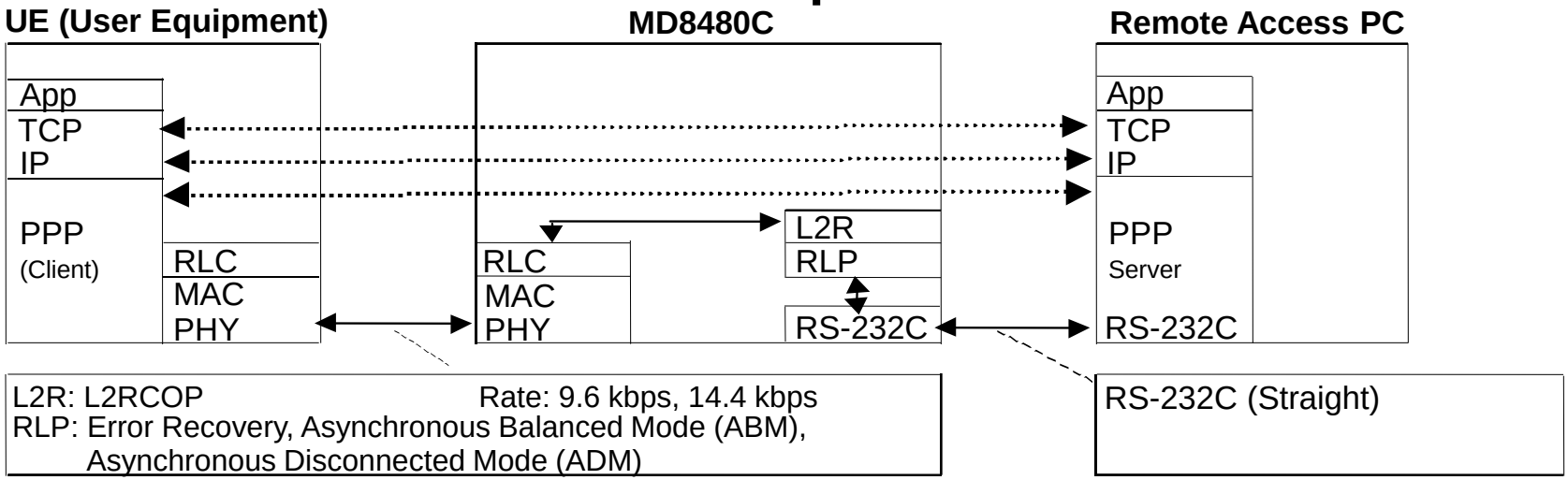


Fig. 4. Protocol Stack Diagram for GSM CSD Function

Note

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Specifications are subject to change without notice.

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