Technical Note

Getting Started with Message Coder

How to analyze L3 Messages

MD8480C
W-CDMA Signalling Tester

Getting Started with Message Coder

How to analyze L3 Messages

Version 1.0
Anritsu Corporation

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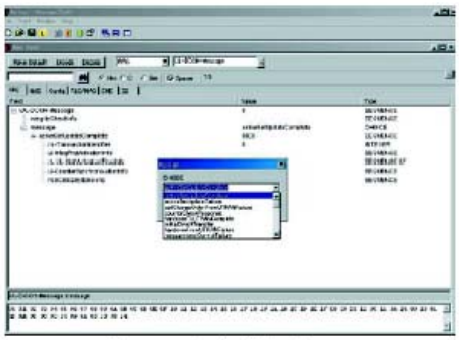
What is Message Coder?

What is Message Coder?

Message Coder*1 is a software tool for creating and analyzing higher-layer messages exchanged between GSM/WCDMA base stations and mobile terminals.

*1: The MD8480C includes this message encode/decode tool for scenario creation and analysis.



Message Coder Main Screen

• **Supported Messages**

Category	Message	Reference Spec. *1
RRC	RRC Layer	3GPP TS25.331
NAS	NAS Layer	3GPP TS24.007, TS24.008
Config	Layer 1, Layer 2 Control	-
RLC/MAC Control	RLC/MAC Control	3GPP TS04.60
SS	Supplementary Service	3GPP TS24.080
SMS	SMS (SM-RL/SM-TL)	3GPP TS23.040
CBS	CBS	3GPP TS23.041, TS25.324
Layer 3 Messages *2		Reference Spec. *1
CC	Messages for Circuit-switched Call Control (35)	3GPP TS24.008, 9.3
MM	Messages for Mobility Management (22)	3GPP TS24.008, 9.2
GMM	GPRS Mobility Management Messages (23)	3GPP TS24.008, 9.4
SM	GPRS Session Management Messages (16)	3GPP TS24.008, 9.5
SMS	Messages for Short Message or Notification Transfer on CM (3)	3GPP TS24.001, 7.2
RR	Messages for Radio Resource Management (82)	3GPP TS04.18, 9.1
SS	Messages for Supplementary Services Control (3)	3GPP TS24.080, 2.2

- 1: Bundled RRC and NAS definition files are standardized by 3GPP in June 2001 (R99), March 2002 (R99), December 2002 (R99), and December 2005 (Rel. 5). RRC definition files standardized in June 2006 (Rel. 6) are also bundled.
- 2: High-layer protocols in messages are not supported.

Analyzing RRC Messages from Trace Window

Analyzing RRC Messages from Trace Window

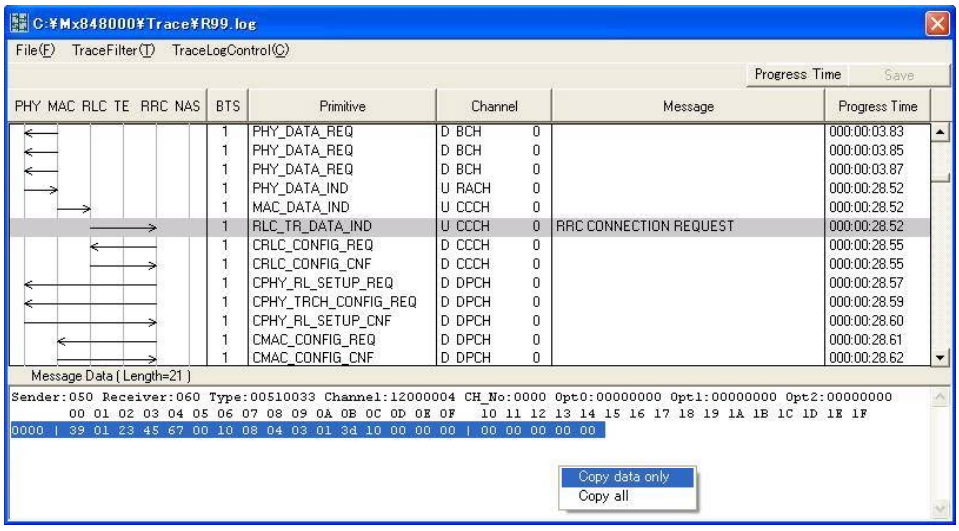
Message Coder decodes RRC Messages from the following messages on the Trace window.

Uplink CCCH (U_CCCH-U_RACH): rrcConnectinRequest
Downlink CCCH (D_CCCH-D_FACH): rrcConnectinSetup
Uplink DCCH (U_DCCH-U_DCH): rrcConnectinSetupComplete
Downlink DCCH (D_DCCH-D_DCH): rrcConnectinRelease

Procedure

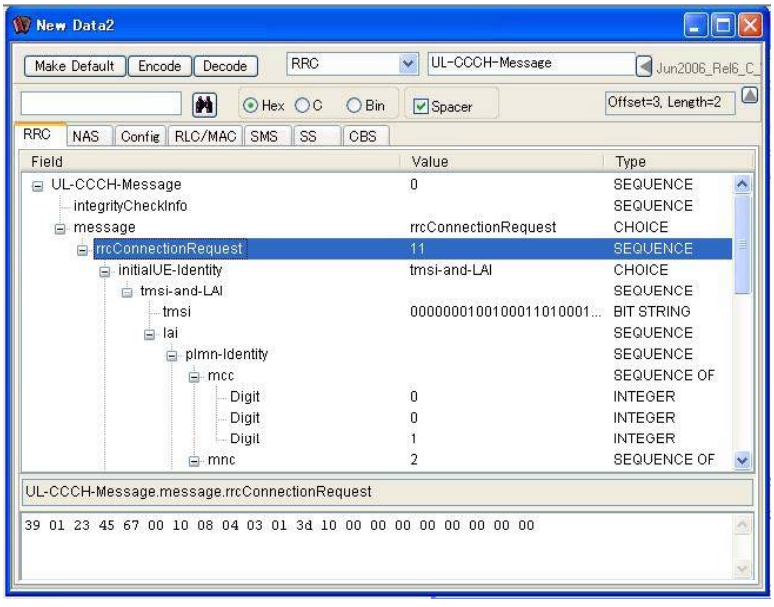
- Select the target message in the Trace window.
- Copy message data from the primitive details partition in the Trace window.
- Paste the data to the Message View Area in Message Coder.
- Press the Decode button in Message Coder.
- View the message details in the Tree View Area in Message Coder.

Trace: U_CCCH (RRC CONNECTION REQUEST)



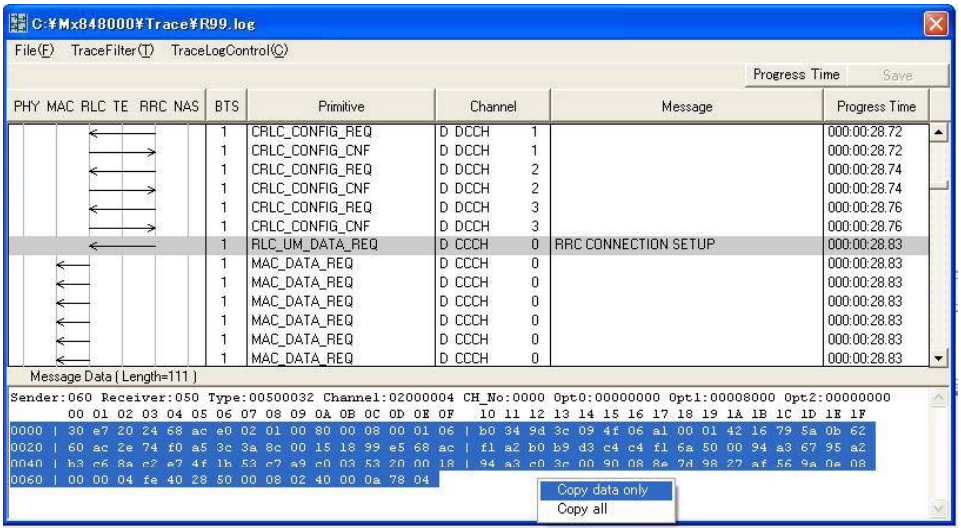
- Select **RRC CONNECTION REQUEST**.
- Right-click and select **Copy data only**.

Message Coder: RRC (UL-CCCH-Message)



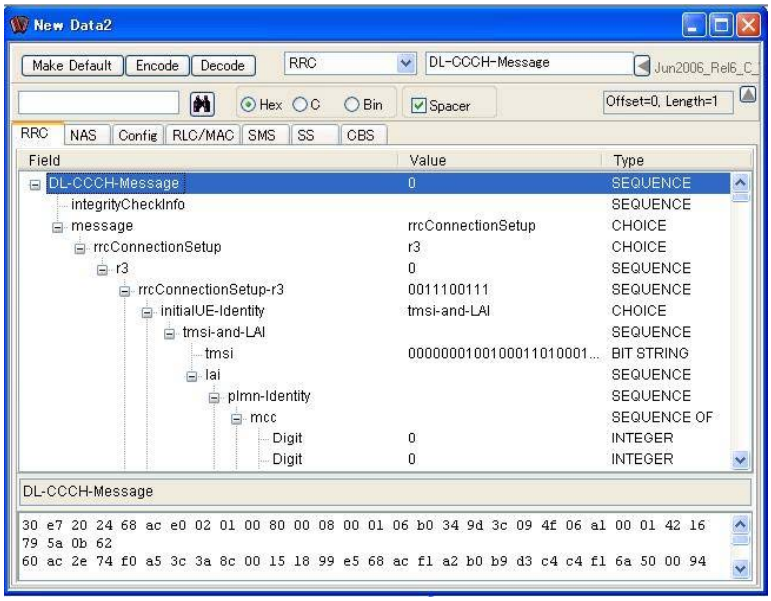
- Setup:
  RRC
  UL-CCCH-Message
  Hex
  Spacer
- Paste the data.
- Press **Decode**.

Trace: D_CCCH (RRC CONNECTION SETUP)



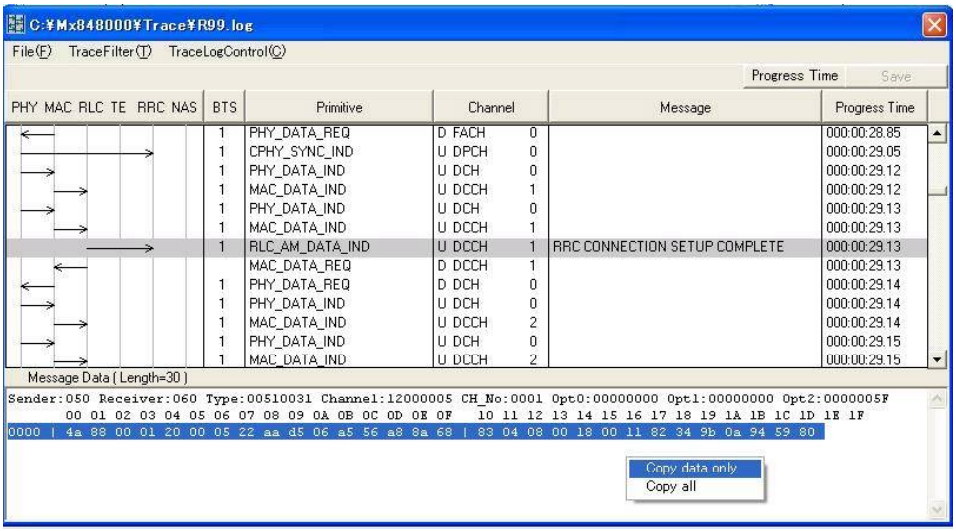
- Select **RRC CONNECTION SETUP**.
- Right-click and select **Copy data only**.

Message Coder: RRC (DL-CCCH-Message)



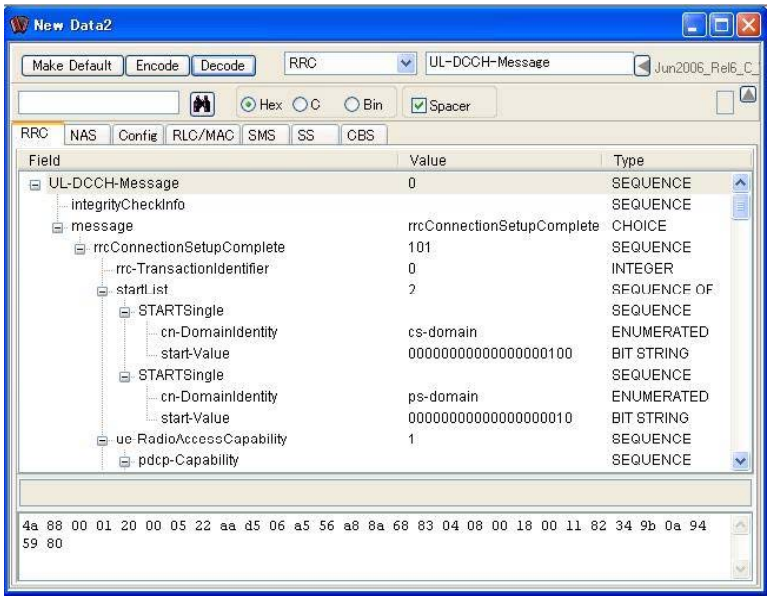
- Setup:
  RRC
  DL-CCCH-Message
  Hex
  Spacer
- Paste the data.
- Press **Decode**.

Trace: U_DCCH (RRC CONNECTION SETUP COMPLETE)



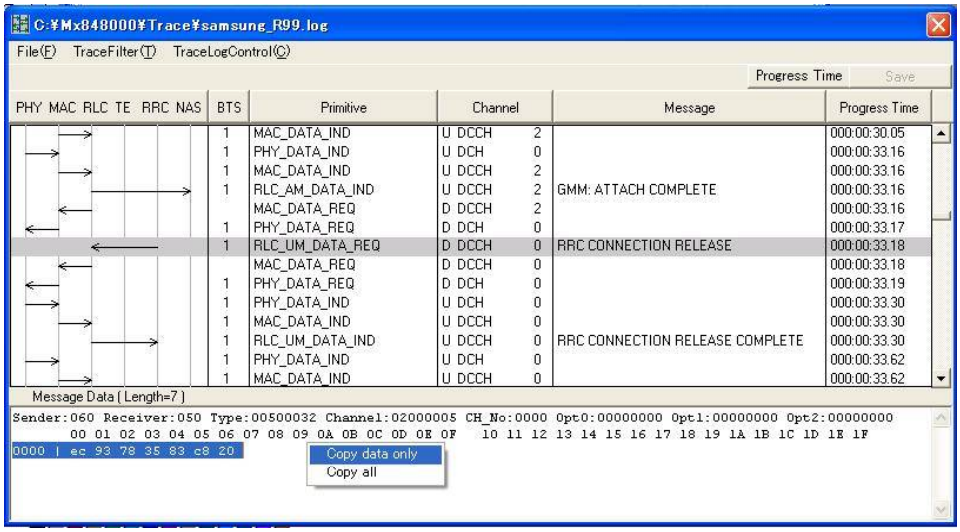
- Select **RRC CONNECTION SETUP COMPLETE**.
- Right-click and select **Copy data only**.

Message Coder: RRC (UL-DCCH-Message)



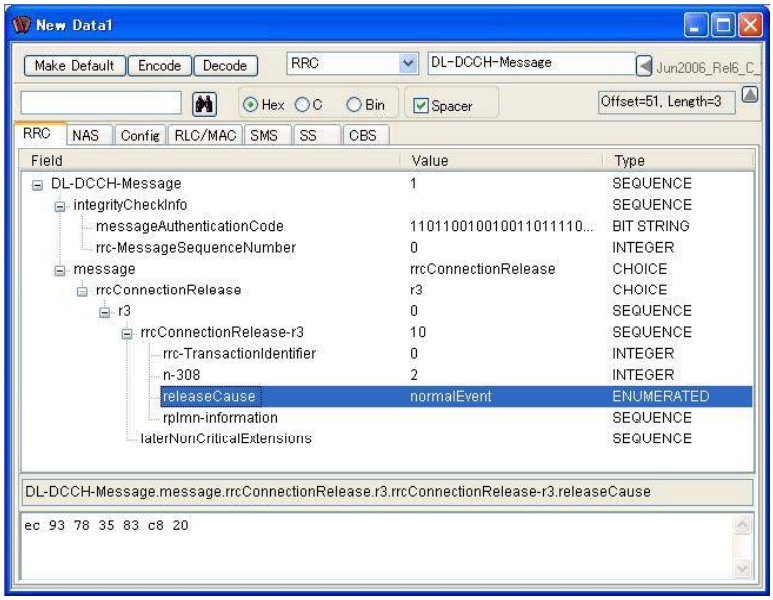
- Setup:
  RRC
  UL-DCCH-Message
  Hex
  Spacer
- Paste the data.
- Press **Decode**.

Trace: D_DCCH (RRC CONNECTION RELEASE)



- Select **RRC CONNECTION RELEASE**.
- Right-click and select **Copy data only**.

Message Coder: RRC (DL-DCCH-Message)



- Setup:
  RRC
  DL-DCCH-Message
  Hex
  Spacer
- Paste the data.
- Press **Decode**.

Analyzing NAS Messages from Trace Window

Analyzing NAS Messages from Trace Window

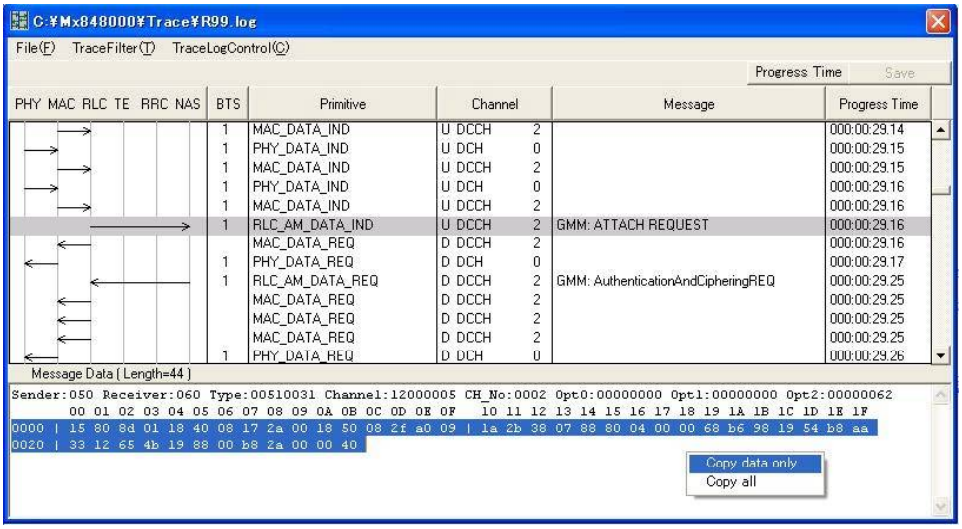
Message Coder decodes NAS Messages from the following messages on the Trace window.

Uplink DCCH (U_DCCH-U_DCH): GMM, AttachRequest
Downlink DCCH (D_DCCH-D_DCH):
GMM, AuthenticationAndCipheringRequest

There are two steps to analyze NAS messages.

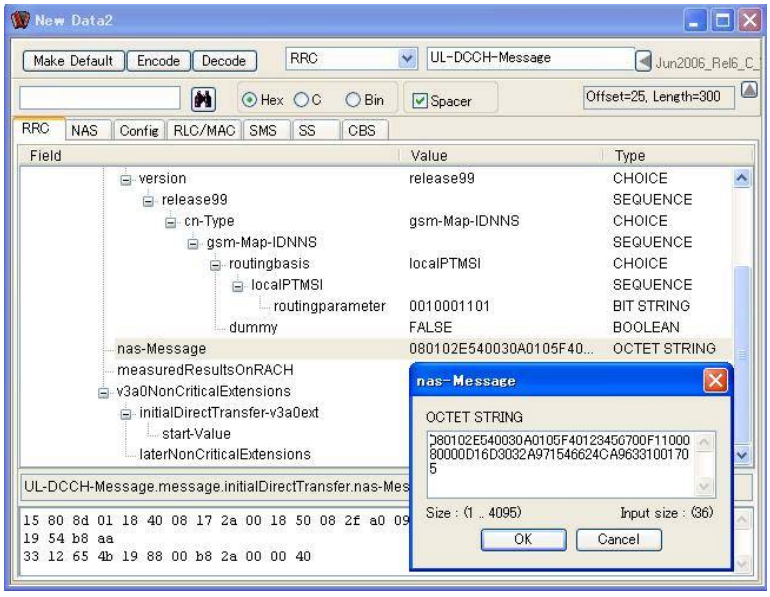
- First, analyze in the same way as RRC messages.
- Next, extract the NAS message from the decoded RRC message and decode the NAS message.

Trace: U_DCCH (GMM:ATTACH REQUEST)



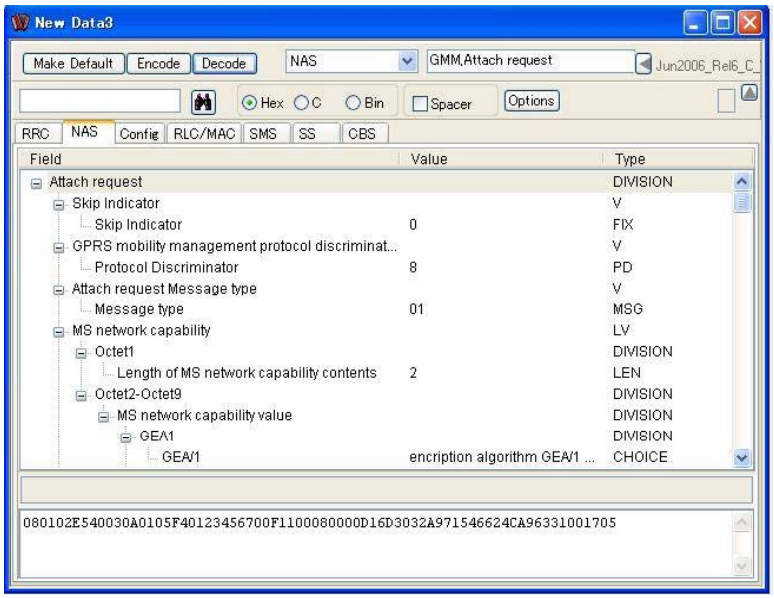
- Select **GMM: ATTACH REQUEST**.
- Right-click and select **Copy data only**.

Message Coder: RRC (UL-DCCH-Message)



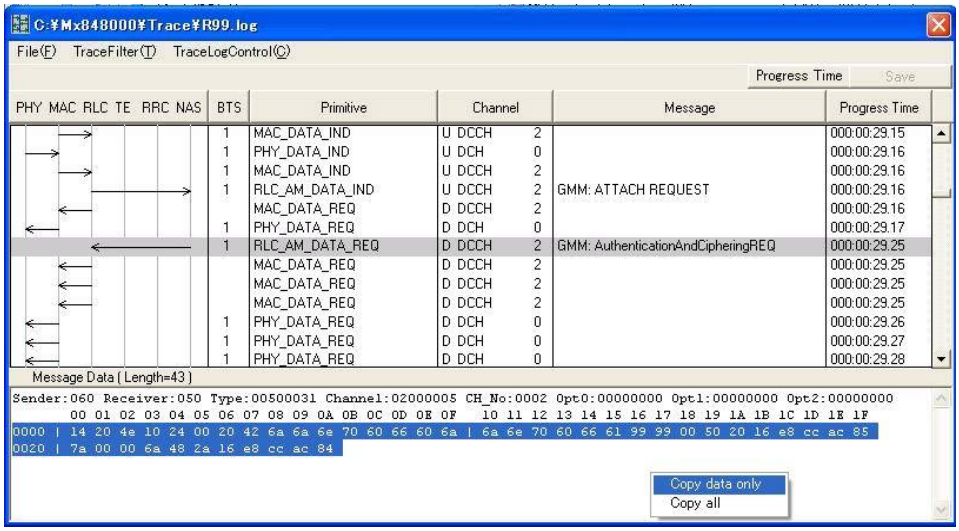
- Setup:
  RRC
  UL-DCCH-Message
  Hex
  Spacer
- Paste the data.
- Press **Decode**.
- Double-click **nas-Message**.
- Copy entire the **OCTET STRING** data.
- Press Cancel.

Message Coder: NAS (GMM, Attach request)



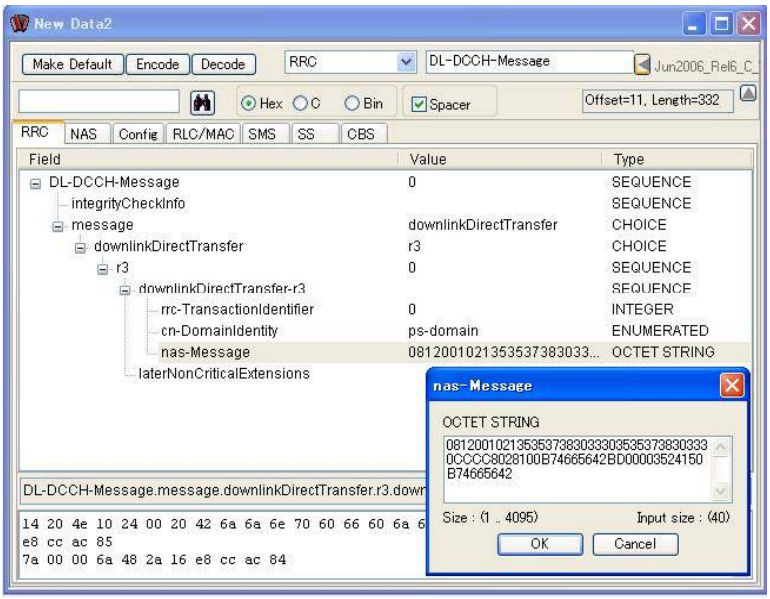
- Setup:
  NAS
  GMM,Attach request
  Hex
  No Spacer
- Paste the data.
- Press **Decode**.

Trace: D_DCCH (GMM, AuthenticationAndCipherREQ)



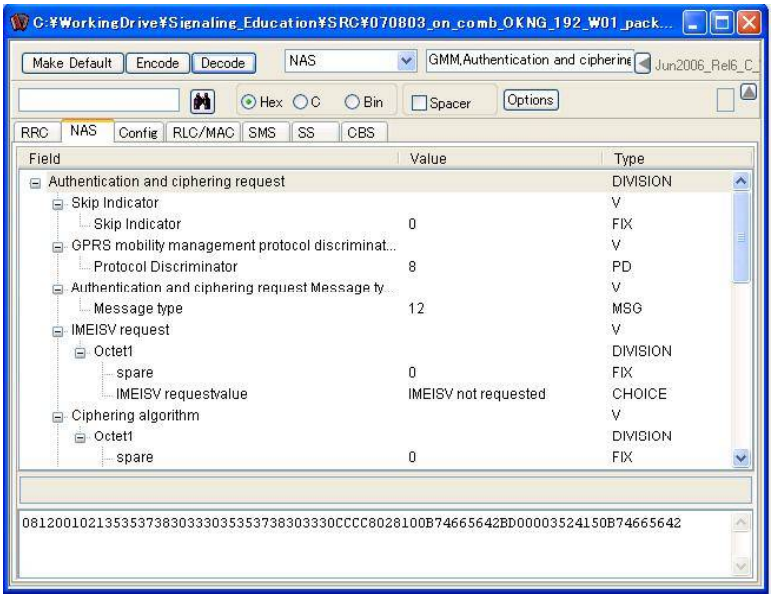
- Select **GMM: AuthenticationAndCipheringREQ**.
- Right-click and select **Copy data only**.

Message Coder: RRC(DL-DCCH-Message)



- Setup:
  RRC
  DL-DCCH-Message
  Hex
  Spacer
- Paste the data.
- Press **Decode**.
- Double-click **nas-Message**.
- Copy the entire **OCTET STRING** data.
- Press Cancel.

Message Coder: NAS (GMM, Authentication and ciphering)



- Setup:
  NAS
  GMM,Authentication and ciphering
  Hex
  No Spacer
- Paste the data.
- Press **Decode.**

Analyzing System Information from Trace Window

Analyzing System Information from Trace window

Message Coder decodes System Information from the following messages on the Trace window.

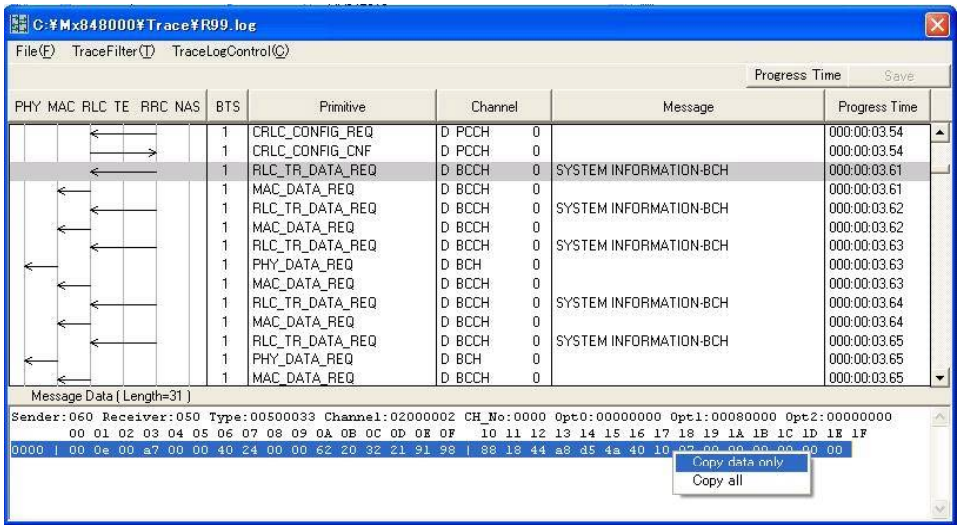
Downlink BCCH (D_BCCH-D_BCH): MasterInformationBlock
Downlink BCCH (D_BCCH-D_BCH): SystemInformationBlockType5

There are two steps to Analyze System Information.

- First, analyze in the same way as RRC messages
- Next, extract the System Information from the decoded RRC message and decode the System Information.

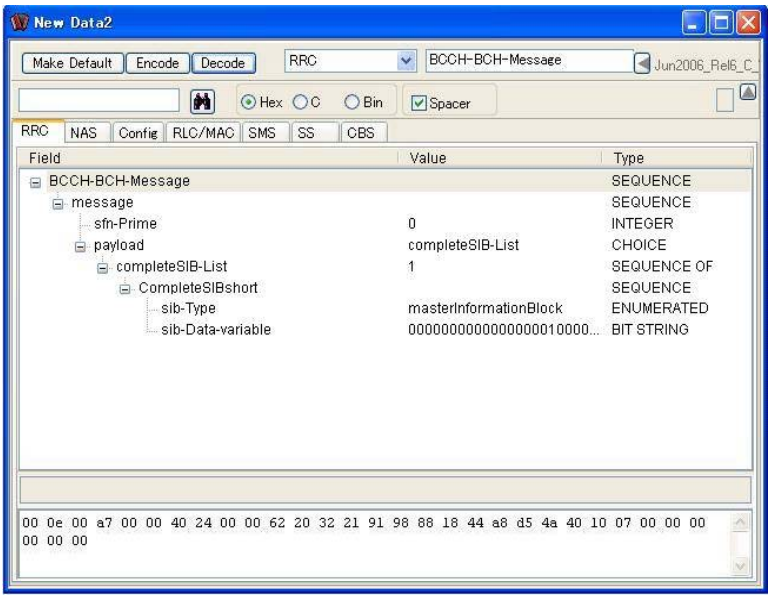
If the System Information is segmented, it must be combined.

Trace: D_BCCH (SYSTEM INFORMATION-BCH) MasterInformationBlock



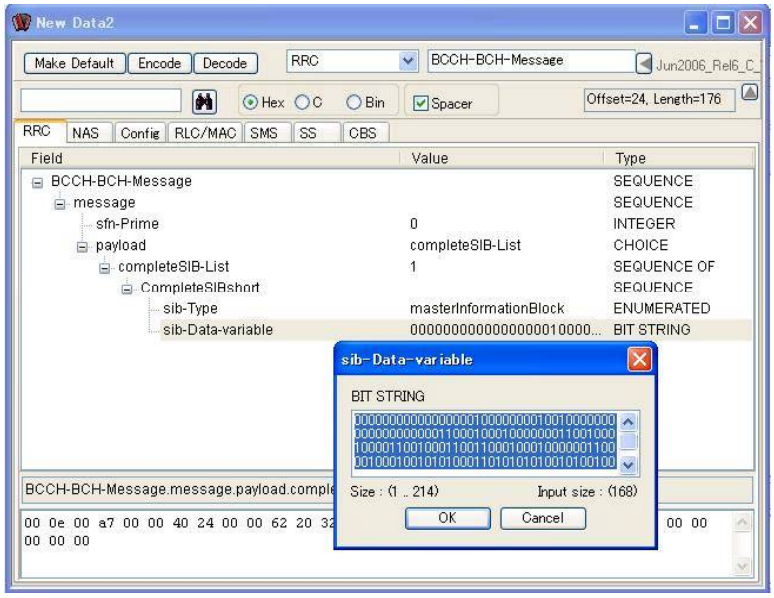
- Select **SYSTEM INFORMATION-BCH**.
- Right-click and select **Copy data only**.

Message Coder: RRC (BCCH-BCH-Message) 1 MasterInformationBlock



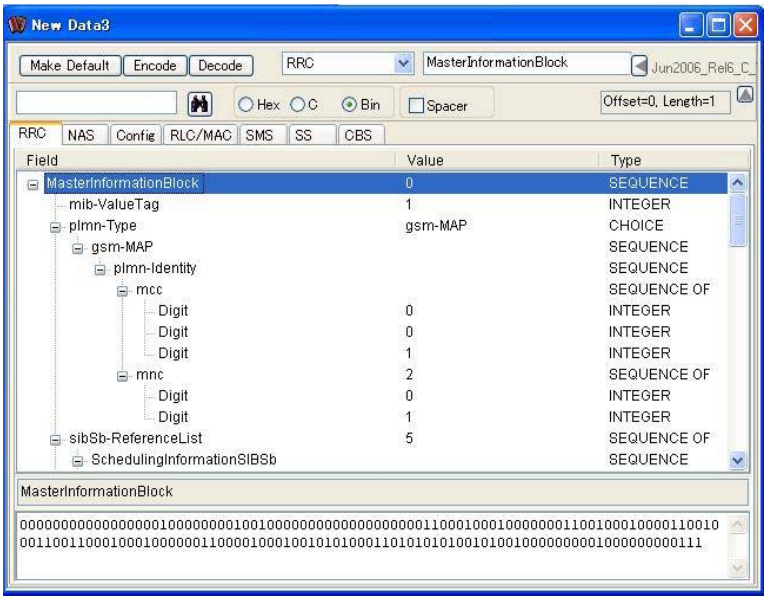
- Setup:
  RRC
  BCCH-BCH-Message
  Hex
  Spacer
- Paste the data.
- Press **Decode**.

Message Coder: RRC (BCCH-BCH-Message) 2 MasterInformationBlock



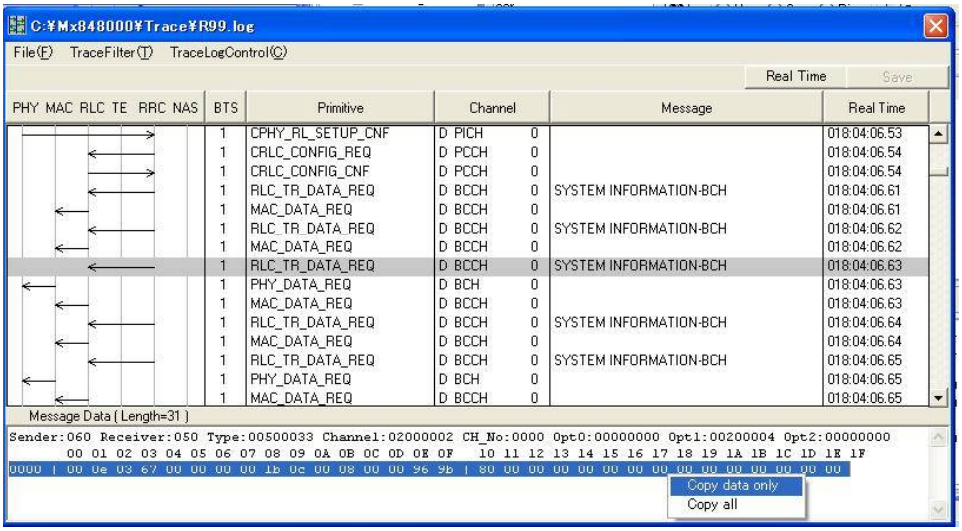
- Double-click the **sib-Data-variable**.
- Copy the entire **BIT STRING** data.
- Press Cancel.

Message Coder: RRC MasterInformationBlock



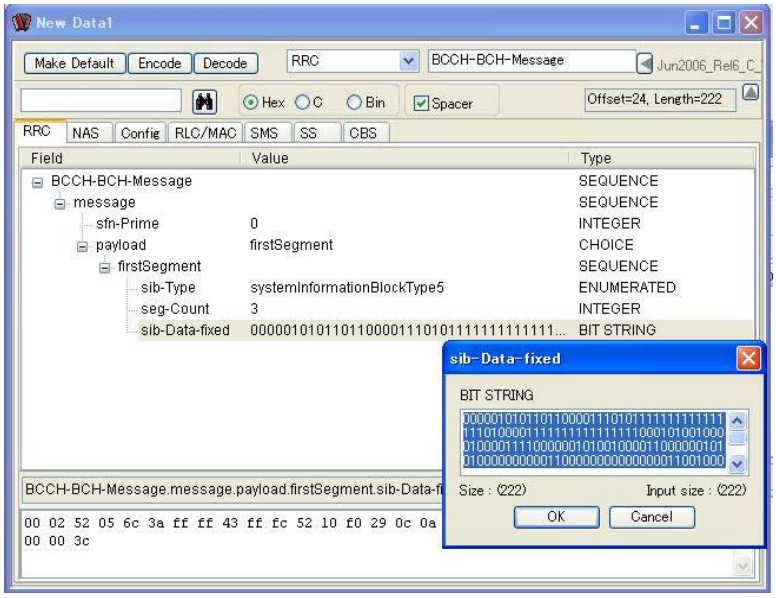
- Open a new MDI window.
- Setup:
  RRC
  MasterInformation-Block
  Bin
  No Spacer
- Paste the data.
- Press **Decode**.

Trace: D_BCCH (SYSTEM INFORMATION-BCH) SystemInformationBlockType5 firstSegment



- Select **SYSTEM INFORMATION-BCH**.
- Right-click and select **Copy data only**.

Message Coder: RRC (BCCH-BCH-Message) SystemInformationBlockType5 firstSegment



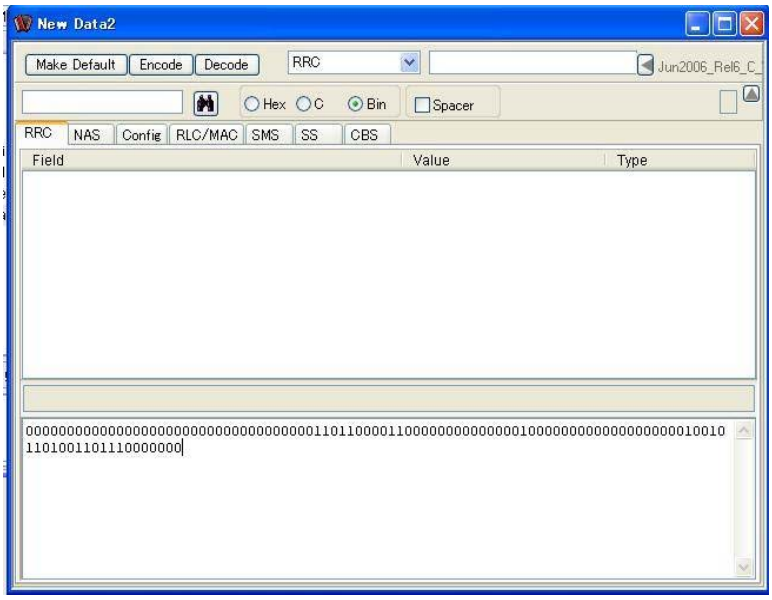
- Setup:
  RRC
  BCCH-BCH-Message
  Hex
  Spacer
- Paste the data.
- Press **Decode**.

- Double-click the **sib-Data-variable**.

- Copy the entire **BIT STRING** data.

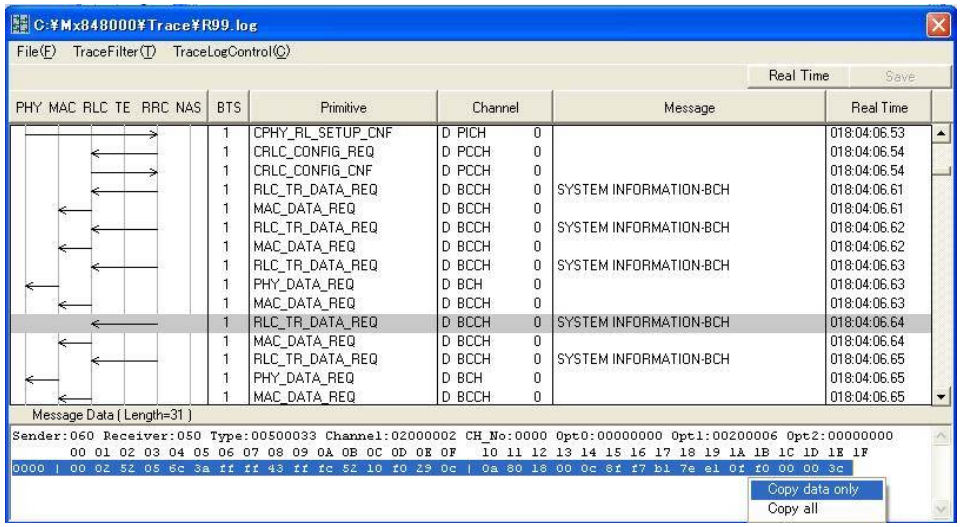
- Press Cancel.

Message Coder: RRC SystemInformationBlockType5 firstSegment



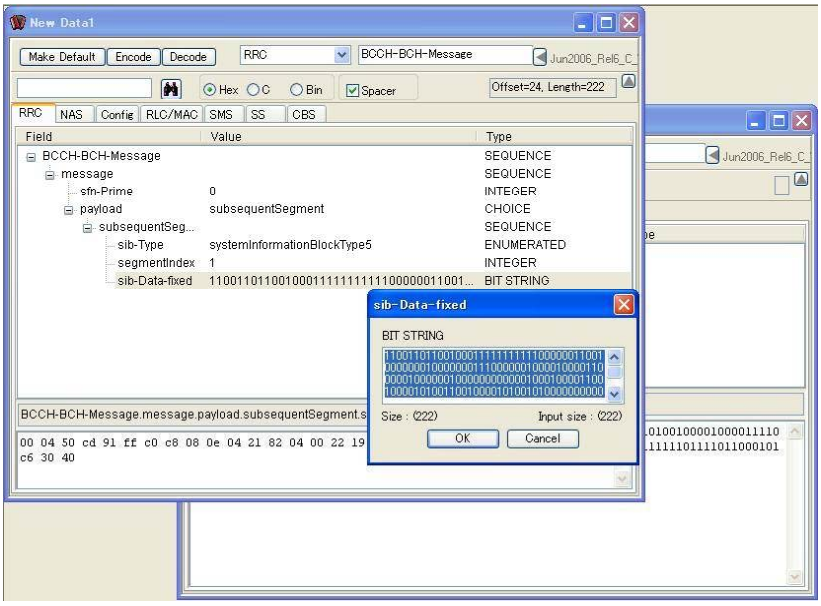
- Open a new MDI window.
- Setup:
  RRC
  Bin
  No Spacer
- Paste the data.

Trace: D_BCCH (SYSTEM INFORMATION-BCH) SystemInformationBlockType5 subsequentSegment

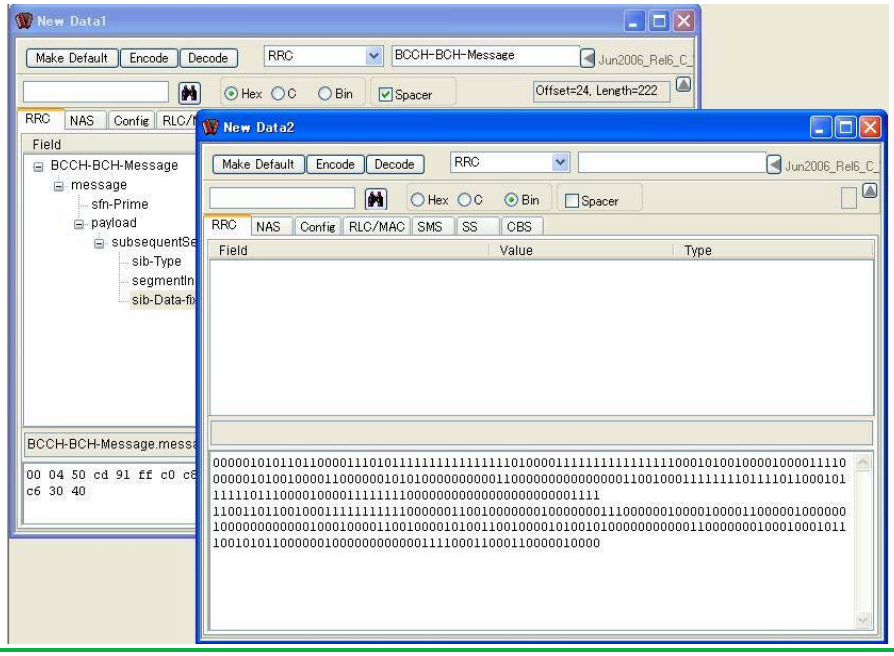


- Select **SYSTEM INFORMATION-BCH**.
- Right-click and select **Copy data only**.

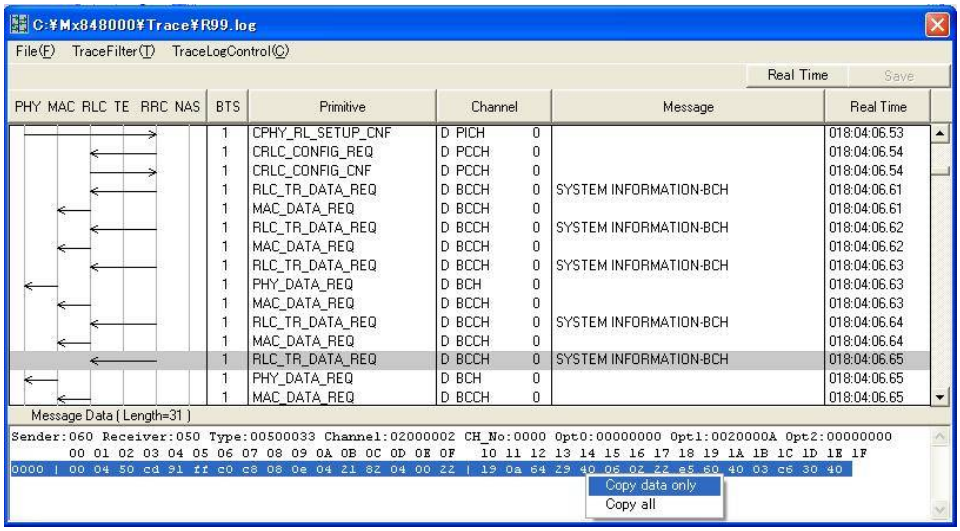
Message Coder: RRC (BCCH-BCH-Message) SystemInformationBlockType5 subsequentSegment



Message Coder: RRC SystemInformationBlockType5 subsequentSegment

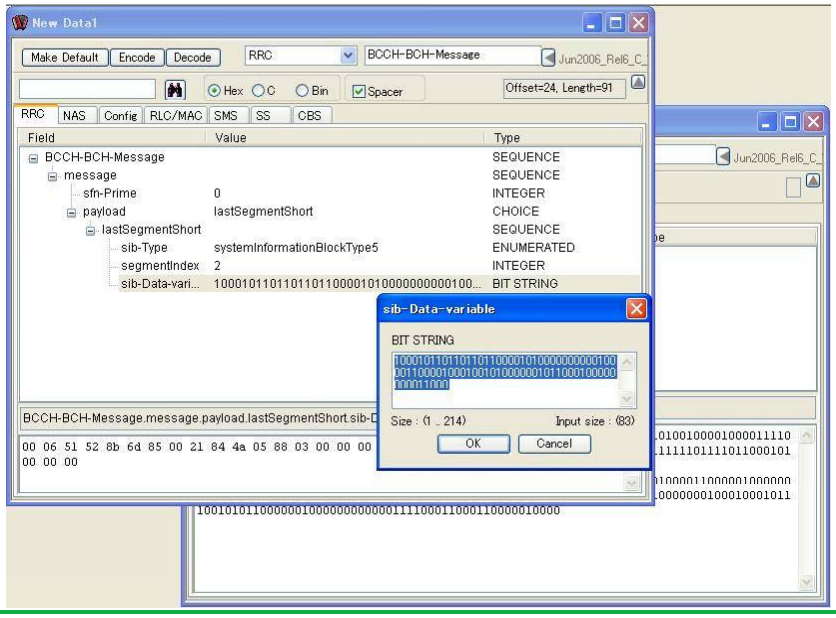


Trace: D_BCCH (SYSTEM INFORMATION-BCH) SystemInformationBlockType5 lastSegmentShort

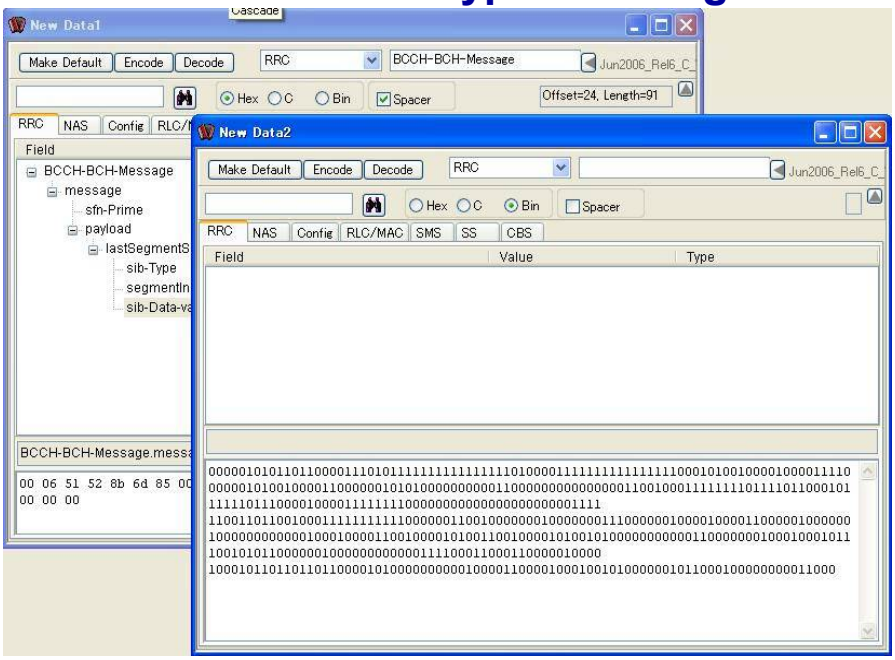


- Select **SYSTEM INFORMATION-BCH**.
- Right-click and select **Copy data only**.

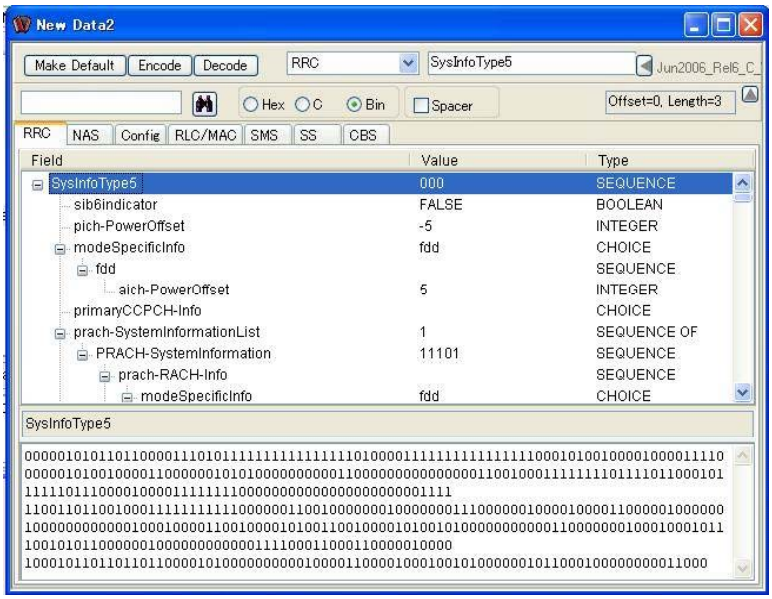
Message Coder: RRC (BCCH-BCH-Message) SystemInformationBlockType5 lastSegmentShort



Message Coder: RRC SystemInformationBlockType5 lastSegmentShort



Message Coder: RRC SystemInformationBlockType5



Press **Decode.**

Checking and Modifying Byte Array Message in C-Scenario

Checking and Modifying Byte Array Message in C-Scenario

Steps:

- Copy the byte array message from the C-Scenario
- Paste it into Message Coder
- Decode
- Check the Value, Offset, and Length message items
- Modify the message items
- Encode
- Copy the message data to the C-Scenario

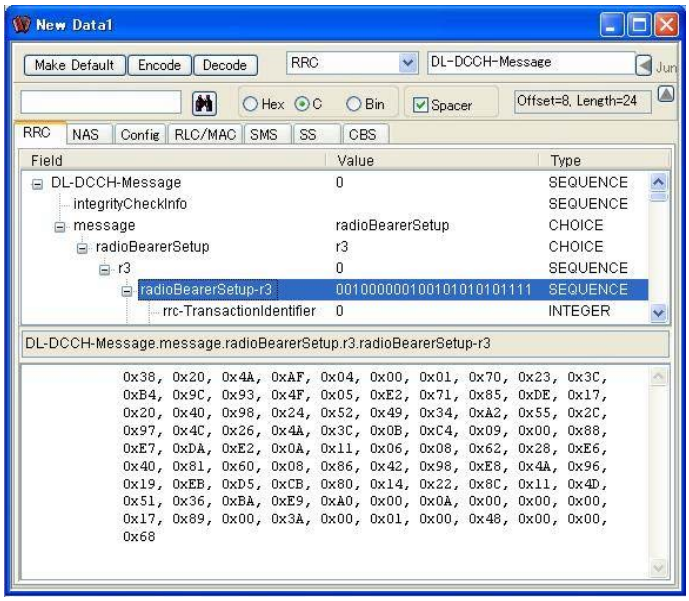
Visual Studio:
Copy byte array message radioBearerSetup

W01_voice_MD8480.c | W01_packet_MD8480.c

```
/* Send Message: Radio Bearer Setup */
{
    UCHAR SndData[] = {
        0x38, 0x20, 0x4A, 0xAF, 0x04, 0x00, 0x01, 0x70, 0x23, 0x3C,
        0xB4, 0x9C, 0x93, 0x4F, 0x05, 0xE2, 0x71, 0x85, 0xDE, 0x17,
        0x20, 0x40, 0x98, 0x24, 0x52, 0x49, 0x34, 0xA2, 0x55, 0x2C,
        0x97, 0x4C, 0x26, 0x4A, 0x3C, 0x0B, 0xC4, 0x09, 0x00, 0x88,
        0xE7, 0xDA, 0xE2, 0x0A, 0x11, 0x06, 0x08, 0x62, 0x28, 0xE8,
        0x40, 0x81, 0x60, 0x08, 0x86, 0x42, 0x98, 0xE8, 0x4A, 0x96,
        0x19, 0xEB, 0xD5, 0xCB, 0x80, 0x14, 0x22, 0x8C, 0x11, 0x4D,
        0x51, 0x36, 0xBA, 0xE9, 0xA0, 0x00, 0x0A, 0x00, 0x00, 0x00,
        0x17, 0x89, 0x00, 0x3A, 0x00, 0x01, 0x00, 0x48, 0x00, 0x00,
        0x68
    };
    {
        CHAR buff[4];

        CFN = ( ( BtsReadCFN( UNIT_BTS1, NO_TIMEOUT ) + 150 ) % 256 ) & ( short )(

        Int2MsbIE( CFN, buff, 8 );
        ReplaceIE( SndData, buff, 84, 8 );
        Int2MsbIE( Nsapi, buff, 8 );
        ReplaceIE( SndData, buff, 50, 8 );

        RlcMUI = 1;
        RlcCNF = 1;

        SndMessageIntegrity( UNIT_BTS1, RLC_AM_DATA_REQ, D_DCCH, 1, SndData, 728 );

        RlcCNF = 0;
        SequenceDisp( " send 'Radio Bearer Setup'" );
```

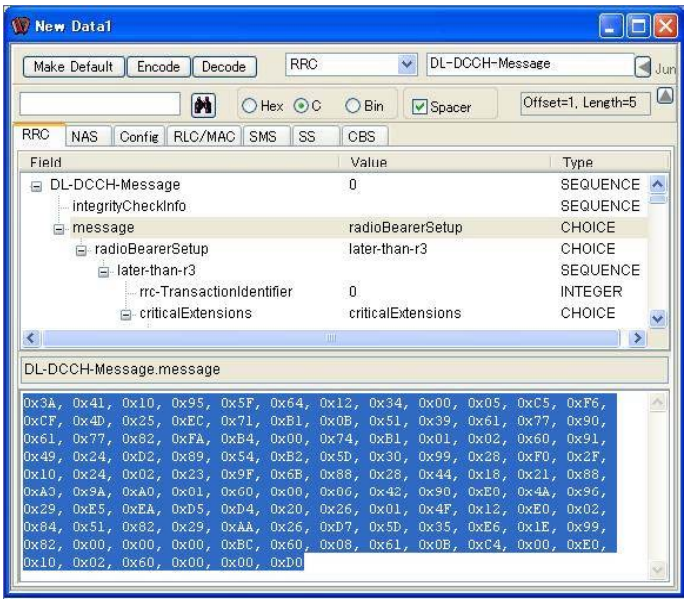
- Select the entire byte array message.
- Copy it.

Message Coder: RRC (DL-DCCH-Message) radioBearerSetup



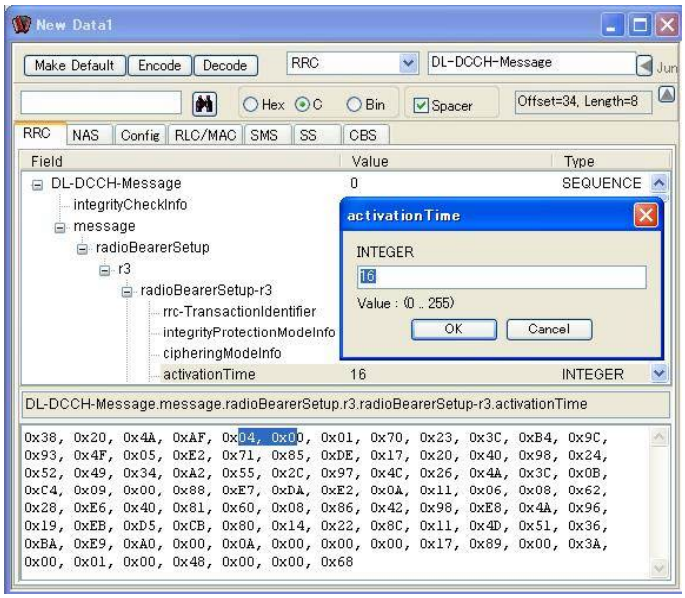
- Setup:
  RRC
  DL-DCCH-Message
  C
  Spacer
- Paste the data.
- Press **Decode**.

Message Coder: Encode radioBearerSetup



Press **Encode**.

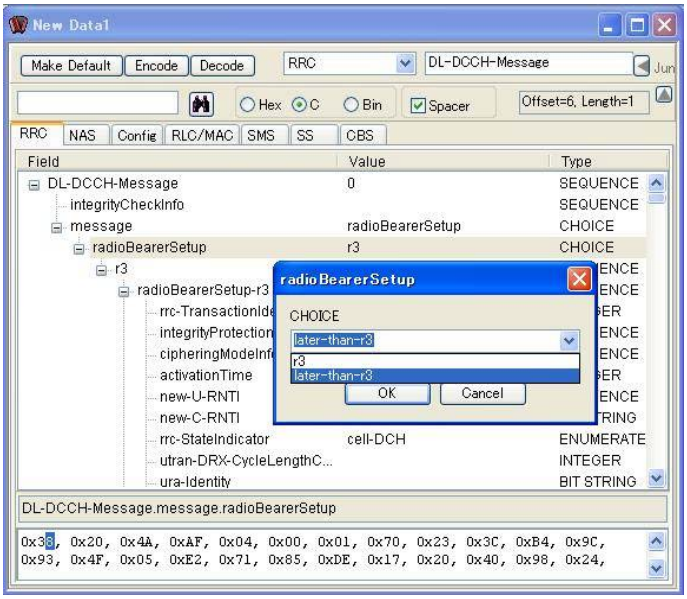
Message Coder: Check activationTime Offset and Length radioBearerSetup



Check the source code.
- Offset = **34**
- Length = **8**

```
Overwritten by following codes.
  Int2MsbIE( CFN, buff, 8 );
  ReplaceIE( SndData, buff, 34, 8 );
```

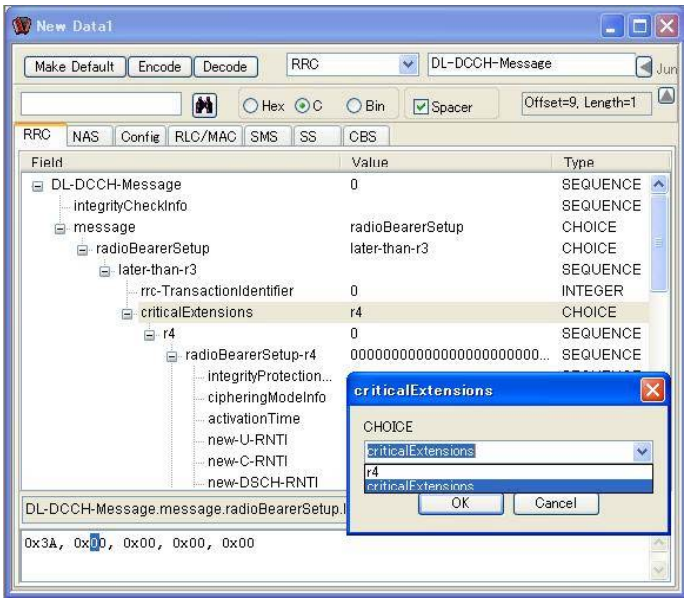
Message Coder: Modify 1 radioBearerSetup



Modify the message item.

Example:
CHOICE type item

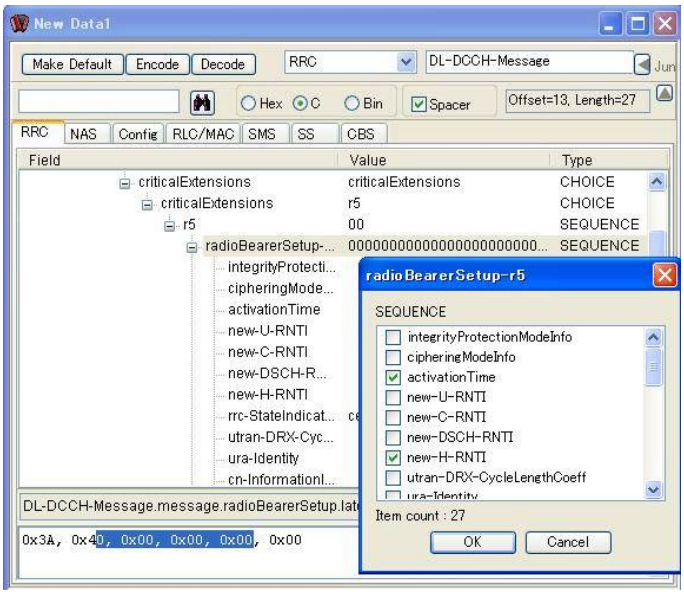
Message Coder: Modify 2 radioBearerSetup



Modify the message item.

Example:
CHOICE type item

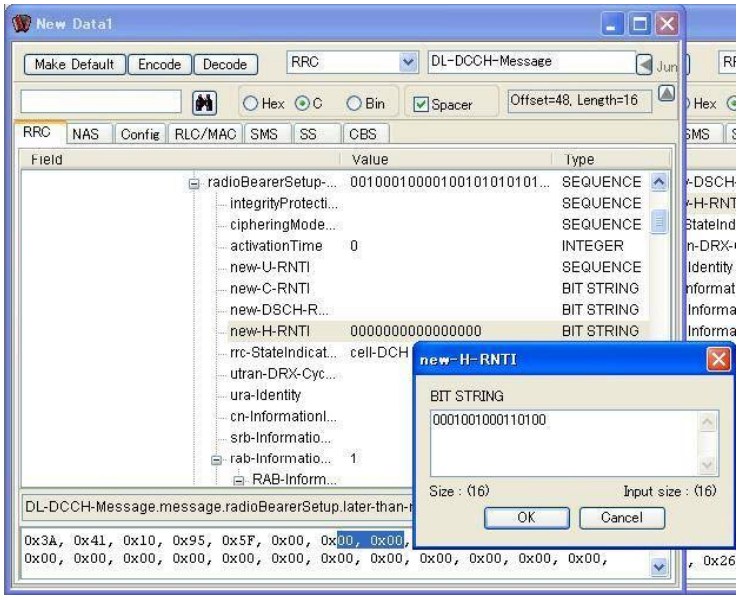
Message Coder: Modify 3 radioBearerSetup



Modify the message item.

Example:
SEQUENCE type item

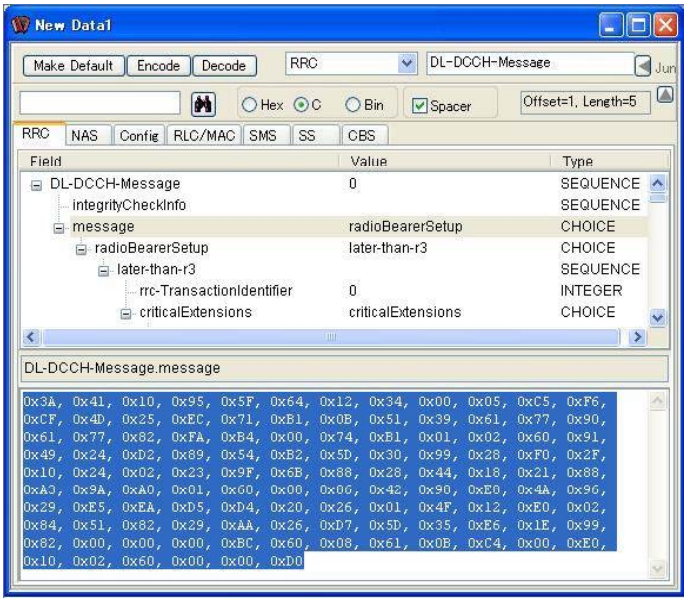
Message Coder: Modify 4 radioBearerSetup



Modify the message item.

Example:
BIT STRING type item

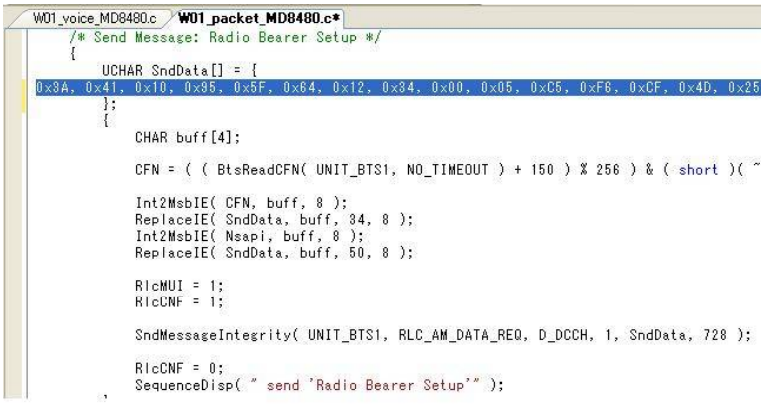
Message Coder: Final Encode and Copy radioBearerSetup



After all modifications:

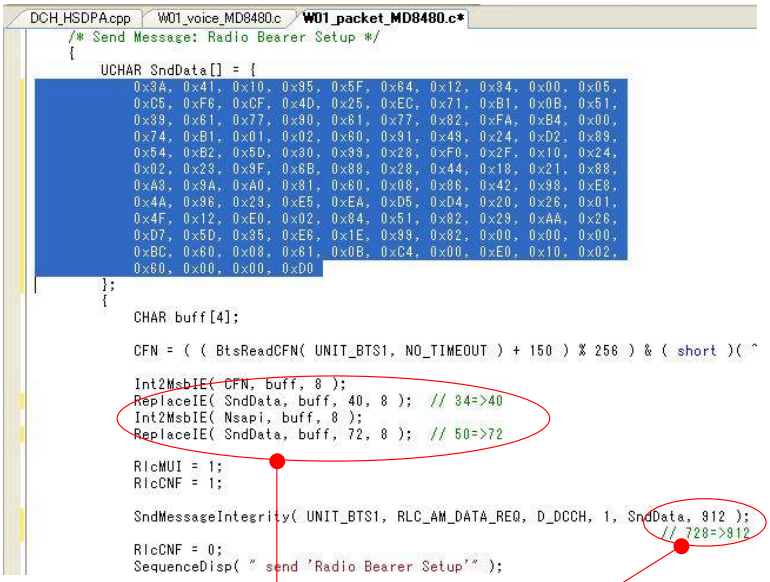
- Press **Encode**.
- Copy the entire message data.

Visual Studio: Paste and Replace byte array radioBearerSetup



- Paste and replace.

Visual Studio: Reformat radioBearerSetup



- Reformat.
- Adjust the message length **in bits** (SndMessageIntegrity).
- Adjust the **Offset** and **Length** message items if necessary.

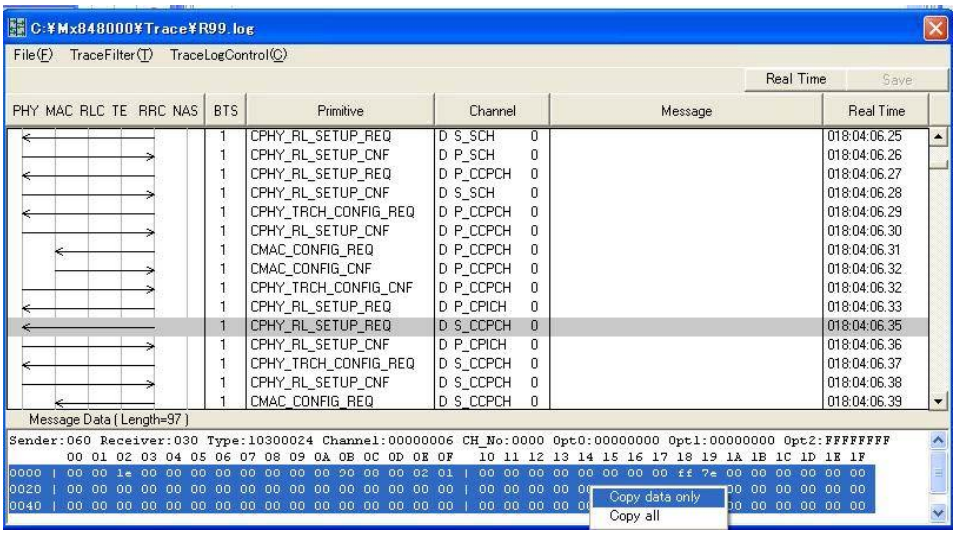
Appendix

Analyzing MD8480C Configuration Primitive from Trace Window

D S_CCPCH channel: CPHY_RL_SETUP_REQ primitive
D S_CCPCH channel: CPHY_TRCH_SETUP_REQ primitive
D S_CCPCH channel: CMAC_CONFIG_REQ primitive

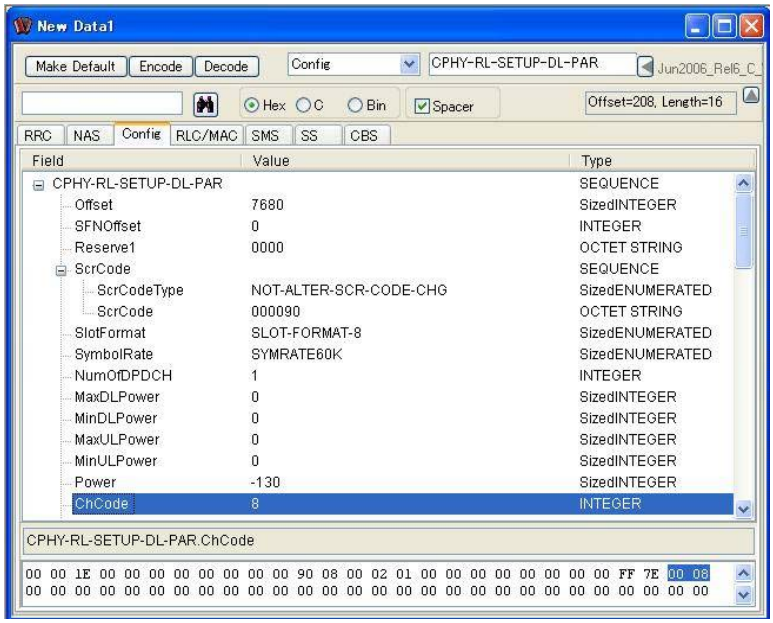
Analyzing the MD8480C configuration primitive is the same as analyzing the RRC message.

Trace: CPHY_RL_SETUP_REQ (D S_CCPCH)



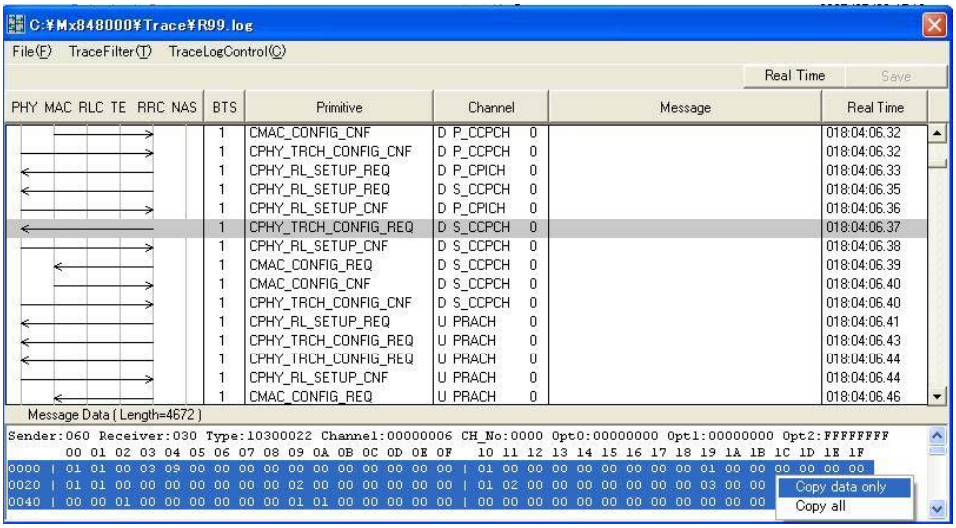
- Select **CPHY_RL_SETUP_REQ** and **D S_CCPCH**.
- Right-click and select **Copy data only**.

Message Coder: Config CPHY-RL-SETUP-DL-PAR



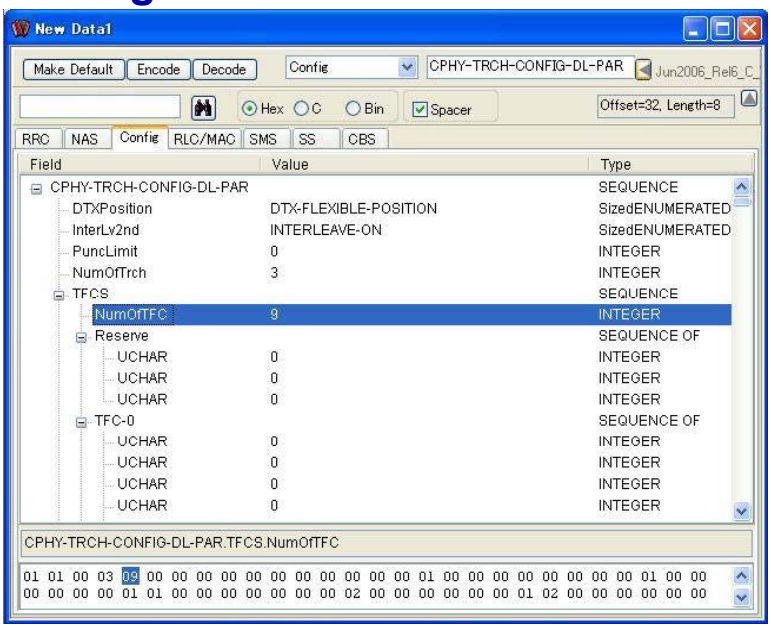
- Setup:
  Config
  CPHY-RL-SETUP-DL-PAR
  Hex
  Spacer
- Paste the data.
- Press **Decode**.

Trace: CPHY_TRCH_SETUP_REQ (D S_CCPCH)



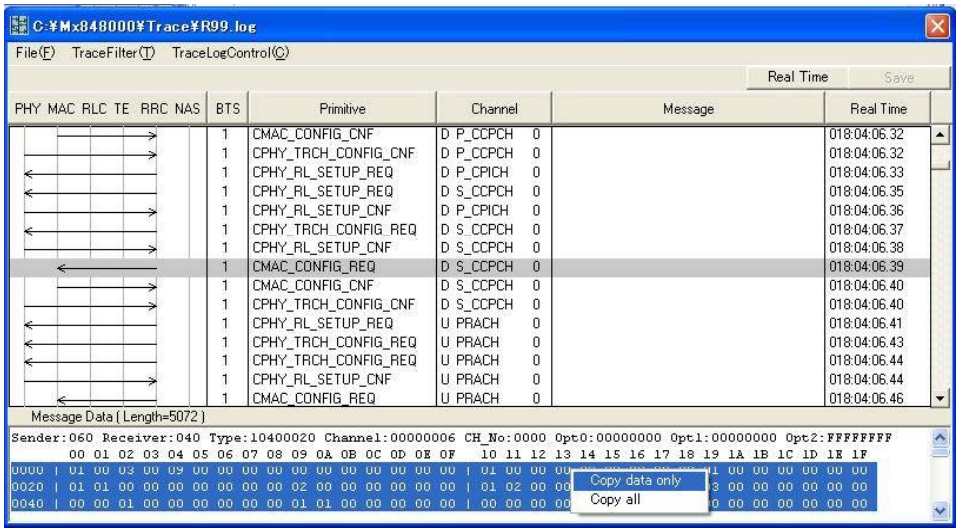
- Select **CPHY_TRCH_SETUP_REQ** and **D S_CCPCH**.
- Right-click and select **Copy data only**.

Message Coder:
Config CPHY-TRCH-SETUP-DL-PAR



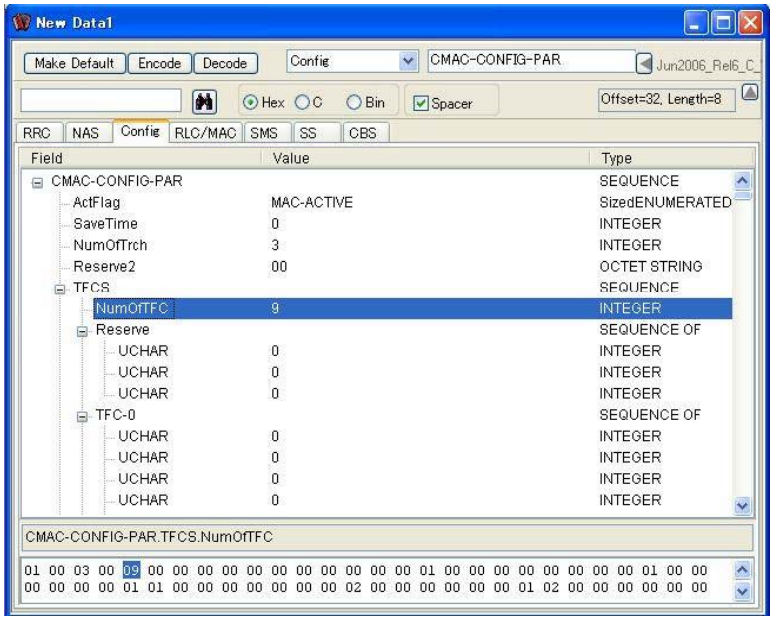
- Setup:
  Config
  CPHY-TRCH-SETUP-DL-PAR
  Hex
  Spacer
- Paste the data.
- Press **Decode**.

Trace: CMAC_CONFIG_REQ (D S_CCPCH)



- Select **CMAC_CONFIG_REQ** and **D S_CCPCH**.
- Right-click and select **Copy data only**.

Message Coder: Config CMAC-CONFIG-DL-PAR



- Setup:
  Config
  CMAC-CONFIG-DL-PAR
  Hex
  Spacer
- Paste the data.
- Press **Decode**.

Definitions Setup

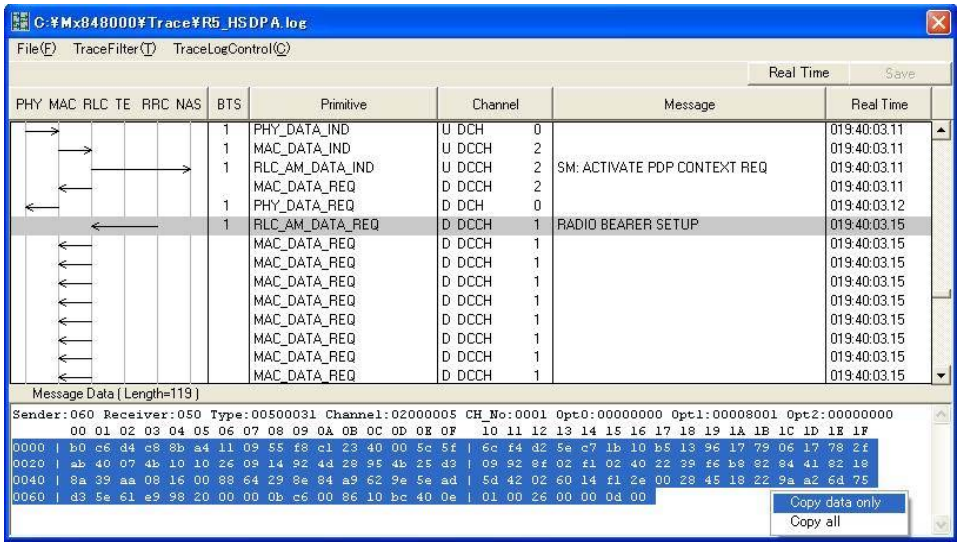
Message Coder requires matching versions for target message and Definitions Setup.

Correct:
Rel. 5 HSDPA radioBearerSetup message with Rel. 6 Definitions Setup.

Incorrect:
Rel. 5 HSDPA radioBearerSetup message with Rel. 99 Definitions Setup.

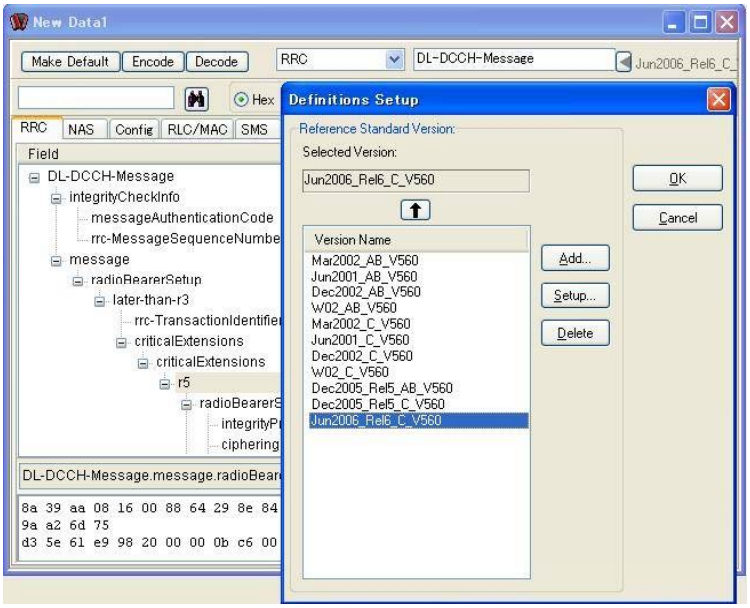
Correct:
Rel. 99 radioBearerSetup message with Rel. 99 Definitions Setup.

Trace: Rel. 5 HSDPA radioBearerSetup message



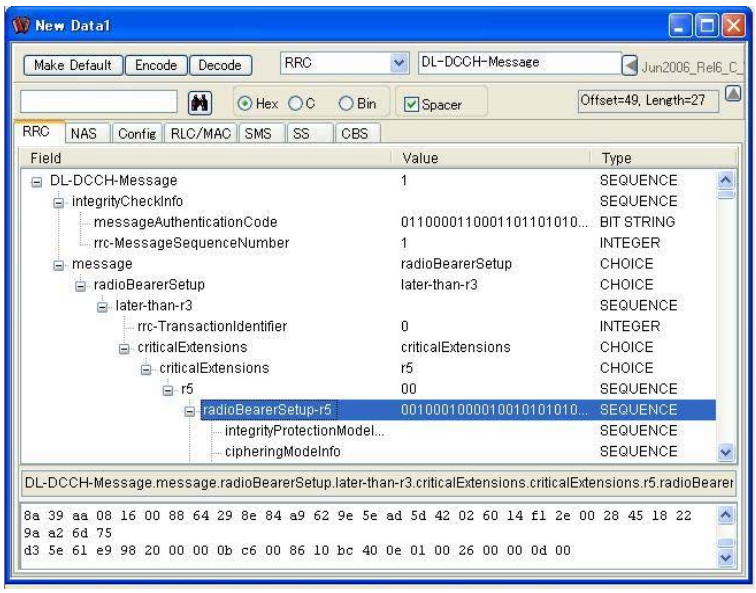
- Select **RADIO BEARER SETUP**.
- Right-click and select **Copy data only**.

Message Coder: Rel. 5 HSDPA radioBearerSetup message with Rel. 6 Definitions Setup 1



•Select **Jun2006_Rel6_C_V560**.

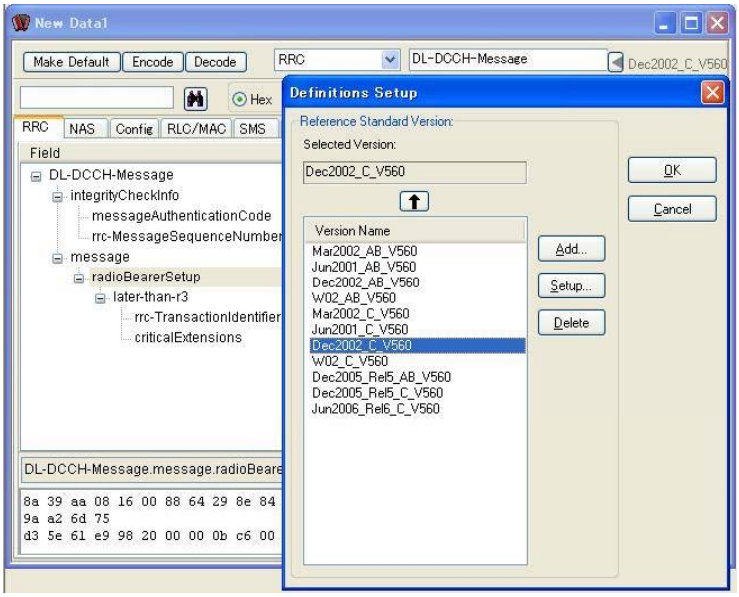
Message Coder: Rel. 5 HSDPA radioBearerSetup message with Rel. 6 Definitions Setup 2



Decode the Rel5-HSDPA **radioBearerSetup** message.

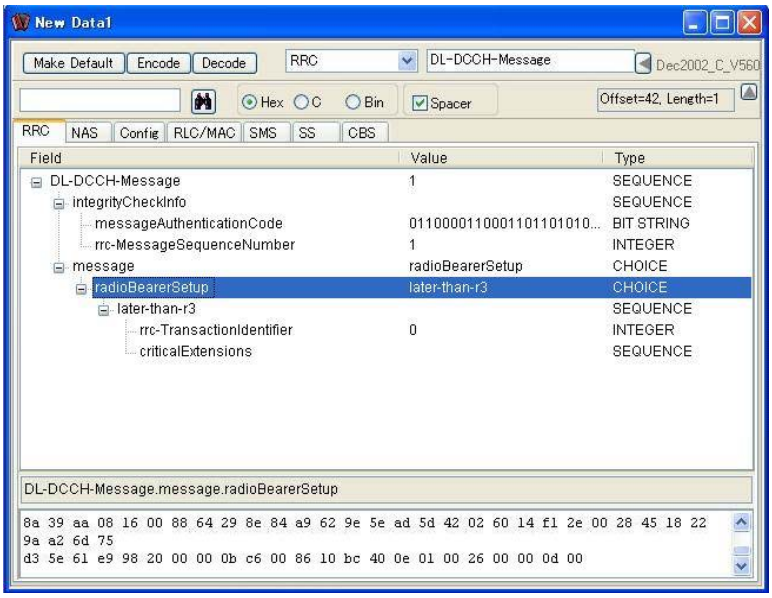
It is correct

Message Coder: Rel. 5 HSDPA radioBearerSetup message with Rel. 99 Definitions Setup 1



Select **Dec2002_C_V560**.

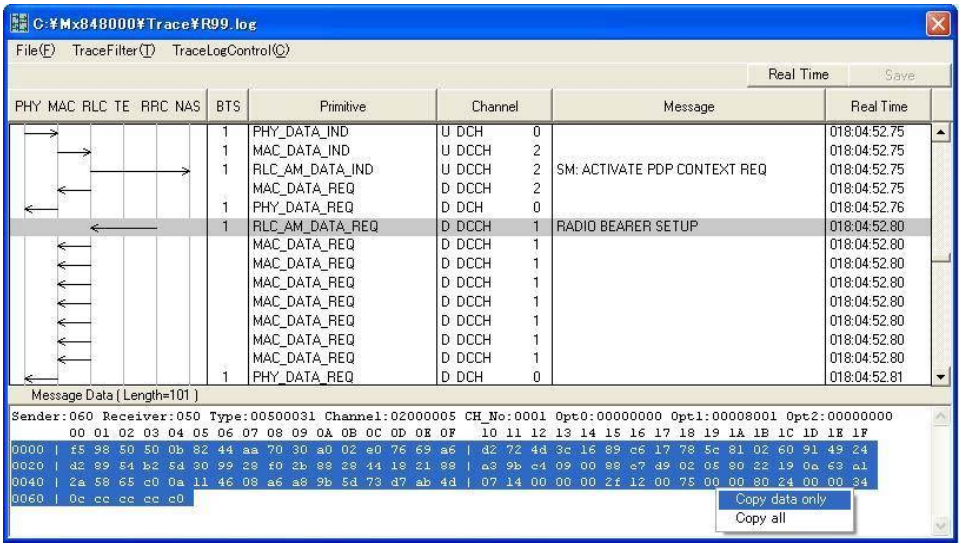
Message Coder: Rel. 5 HSDPA radioBearerSetup message with Rel. 99 Definitions Setup 2



Decode the Rel5-HSDPA **radioBearerSetup** message.

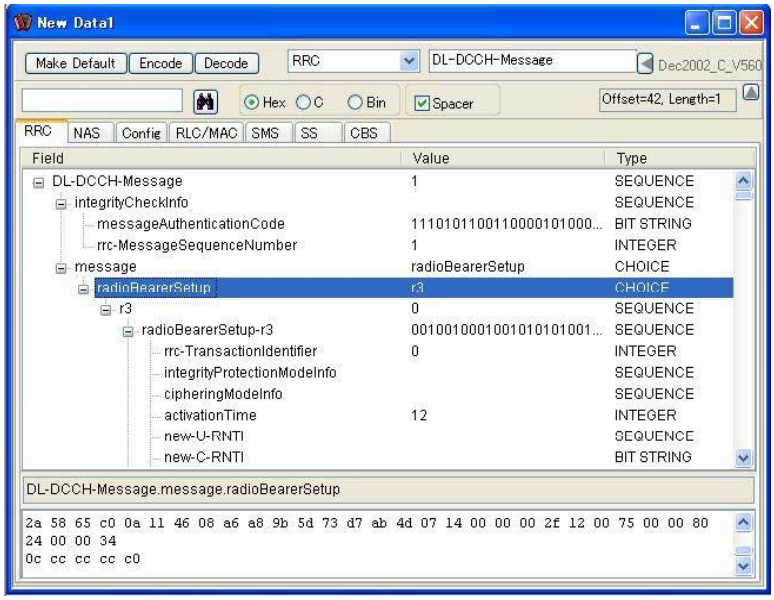
It is incorrect

Trace: Rel. 99 radioBearerSetup message



- Select **RADIO BEARER SETUP.**
- Right click and select **Copy data only**.

Message Coder: Rel. 99 radioBearerSetup message with Rel. 99 Definitions Setup



Decode the Rel99 **radioBearerSetup** message.

It is correct

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Specifications are subject to change without notice.

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