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APPLICATION NOTE

MD8470A

Signalling Tester

Supplementary Services

ANRITSU CORPORATION

MD8470A Signalling Tester Application Note

- Supplementary Services -

Supplementary Services

Anritsu Corporation
Measurement Business Center
Wireless Measurement Division
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1. Glossary of Terms

3GPP： 3rd Generation Partnership Project

SS： Supplementary Services

CW: Call Waiting

CH： Call Hold

CF: Call Forwarding

CB: Call Barring

AoC: Advice of Charge

CAI: Charge Advice Information

USSD： Unstructured Supplementary Service Data

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2. Reference Standards

- 3GPP
  - TS 22.083 Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1
  - TS 23.083 Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 2
  - TS 24.083 Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 3
  - TS 22.084 MultiParty (MPTY) supplementary services - Stage 1
  - TS 23.084 MultiParty (MPTY) supplementary services - Stage 2
  - TS 24.084 MultiParty (MPTY) supplementary services - Stage 3
  - TS 22.024 :Description of Charge Advice Information (CAI)
  - TS 22.086 :Advice of Charge(AoC) supplementary services - Stage 1
  - TS 23.086 :Advice of Charge(AoC) supplementary services - Stage 2
  - TS 24.086 :Advice of Charge(AoC) supplementary services - Stage 3
  - TS 22.090 :Unstructured Supplementary Service Data (USSD) - Stage 1
  - TS 23.090 :Unstructured Supplementary Service Data (USSD) - Stage 2
  - TS 24.090 :Unstructured Supplementary Service Data (USSD) - Stage 3

3. What are Supplementary Services?

- Supplementary Services are functions offered to the end user using appended and supplementary data added to basic communication services such as voice and packet.
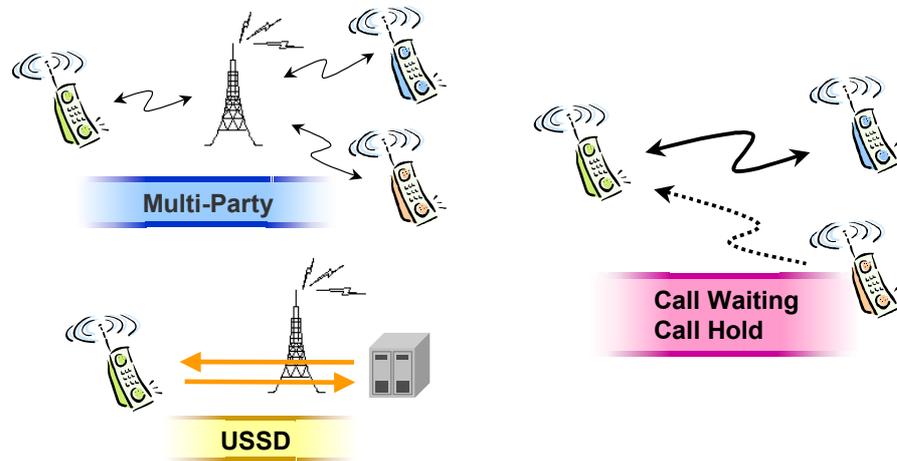
Multi-Party

**Call Waiting
Call Hold**

USSD

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4. Performing Supplementary Service Tests

4-1. Testing Call Waiting/Call Hold Function

4-2. Testing Multi-Party Function

4-3. Testing Advice of Charge Function

4-4. Testing USSD Function

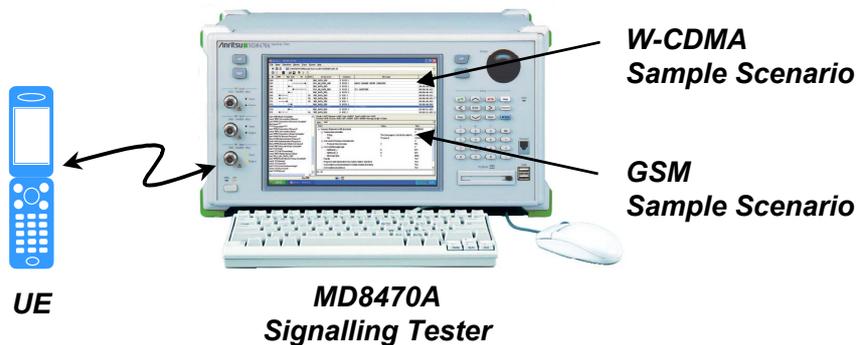Discover What's Possible™

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4-1. Testing Call Waiting/Call Hold Function (1/5)

- Call Waiting/Call Hold Functions:
  - With this function, when a new call occurs during another call, the user is notified and depending on the user's preferences, the current call can be put on hold to accept the new call.
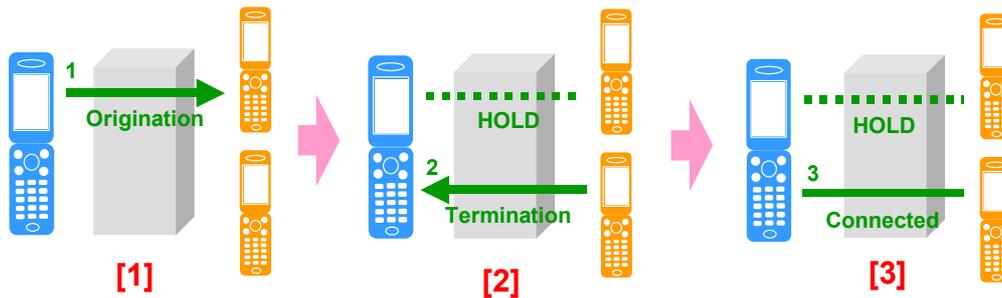

**Call Waiting
Call Hold**

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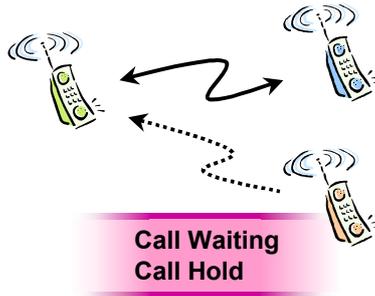
4-1. Testing Call Waiting/Call Hold Function (2/5)

- **Required Hardware & Software**

*W-CDMA
Sample Scenario*

*GSM
Sample Scenario*

UE

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4-1. Testing Call Waiting/Call Hold Function (3/5)

- Second Caller Procedure
  - ✓ After location registration, the first call origination is performed. [1]
  - ✓ The second call is terminated from NW and the first call is put on hold. [2]
  - ✓ The second call is connected. [3]

1 Origination **[1]**

HOLD **2 Termination** **[2]**

HOLD **3 Connected** **[3]**

4-1. Testing Call Waiting/Call Hold Function (4/5)

- Switching to Held First Caller
  - ✓ The connected second call is put on hold. [1]
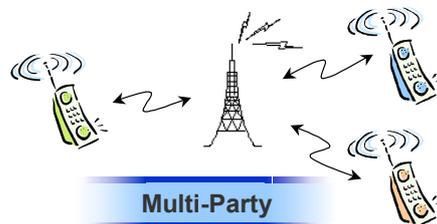 - ✓ The held first call is connected. [2]

HOLD **1 HOLD** **[1]**

2 Retrieve **HOLD** **[2]**
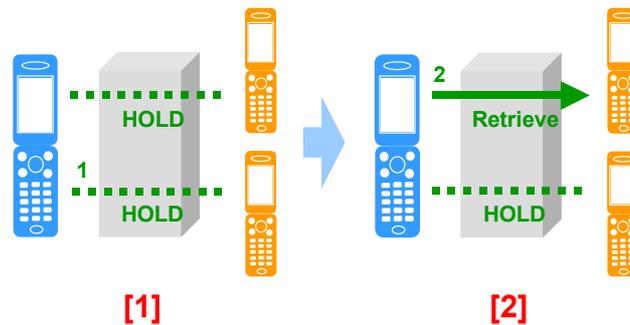
4-1. Testing Call Waiting/Call Hold Function (5/5)

- **<u>Use Scenario</u>**

    - *W-CDMA Sample Scenario*
        - CS + PS/Registration/Combined Attach
        - CS/Operation/Hold/Retrieve

    - *GSM Sample Scenario*
        - CS/Registration/Location Update
        - CS/Operation/Hold/Retrieve

* The above W-CDMA/GSM Sample Scenarios are offered by web download service of MD8470A support service (MX847010A-20).
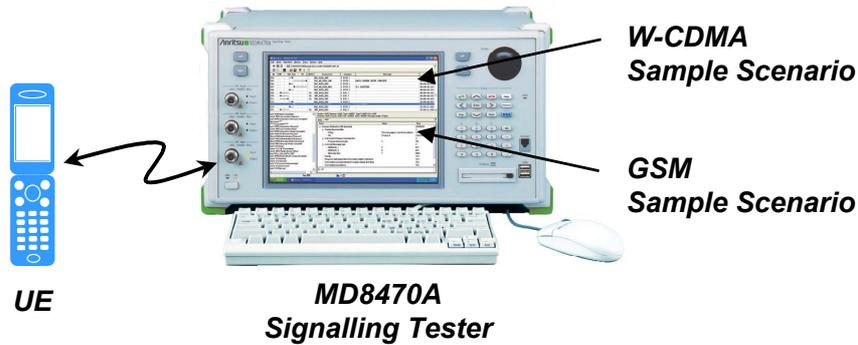

4-2. Testing Multi-Party Function (1/4)

- Multi-Party Functions:
    - When there are both connected and held calls, this function allows the user to switch to multiple simultaneous calls as required.

Multi-Party

4-2. Testing Multi-Party Function (2/4)

- **Required Hardware and Software**

W-CDMA
Sample Scenario

GSM
Sample Scenario

UE

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4-2. Testing Multi-Party Function (3/4)

- Multi Party (Merge) Procedure
  - ✓ After location registration, the first call termination is performed from the NW. [1]
  - ✓ The second call is terminated from the NW and the first call is put on hold. [2]
  - ✓ BuildMPTY is sent to the NW to establish a multi-party call. [3]

1
Termination

HOLD

2
Termination

3
Build
MultiParty

[1]

[2]

[3]

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4-2. Testing Multi-Party Function (4/4)

- **Use Scenario**

  - *W-CDMA Sample Scenario*
    - CS + PS/Registration/Combined Attach
    - CS/Operation/MPTY (Merge)
    - CS/Operation/MPTY (Hold/Retrieve)
    - CS/Operation/MPTY (Split)

  - *GSM Sample Scenario*
    - CS/Registration/Location Update
    - CS/Operation/MPTY (Merge)
    - CS/Operation/MPTY (Hold/Retrieve)
    - CS/Operation/MPTY (Split)

* The above W-CDMA/GSM Sample Scenarios are offered by web download service of MD8470A support service (MX847010A-20).

4-3. Testing Advice of Charge Function (1/4)

- Advice of Charge (AoC):
- This function[*1] notifies the user of the cost of the call based on charging information received from the NW.
  - By using a sample scenario and encode/decode tools, tests can be performed simply under various conditions including changes in call charging information and call charging updates during the call.

Charging Information

Advice of Charge

※1: Displays Advice of Charge (Information)

4-3. Testing Advice of Charge Function (2/4)

- **Required Hardware and Software**

W-CDMA Sample Scenario

GSM Sample Scenario

UE

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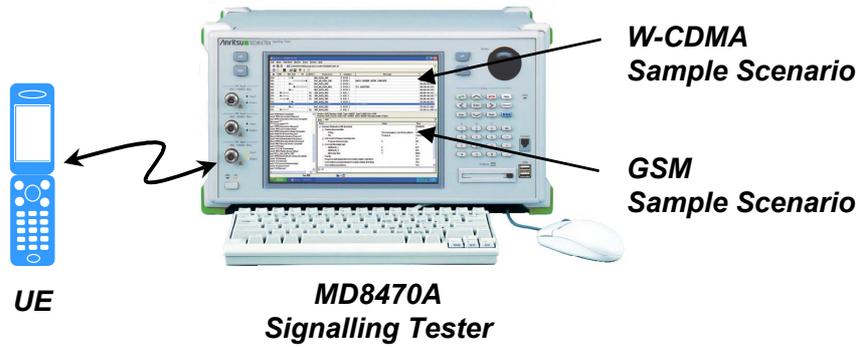
4-3. Testing Advice of Charge Function (3/4)

- AoC (Advice of Charge) Procedure
  - ✓ After location registration, call origination is performed. [1]
  - ✓ During the call, Facility (forwardChargeAdvice) is sent from the NW. [2]
  - ✓ The call charge advice information (CAI) is confirmed at the mobile terminal. [3]
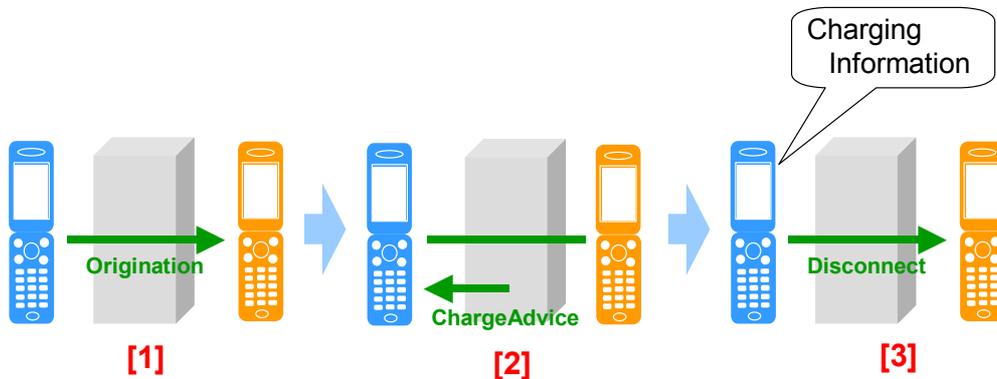
Charging Information

Origination

ChargeAdvice

Disconnect

[1]

[2]

[3]

4-3. Testing Advice of Charge Function (4/4)

- **Use Scenario**

  - ♦ *W-CDMA Sample Scenario*
    - CS + PS/Registration/Combined Attach
    - CS/Operation/AMR MT SS (AoC)

  - ♦ *GSM Sample Scenario*
    - CS/Registration/Location Update
    - CS/Operation/Conversation MT SS (AoC)

* The above W-CDMA/GSM Sample Scenarios are offered by web download service of MD8470A support service (MX847010A-20).

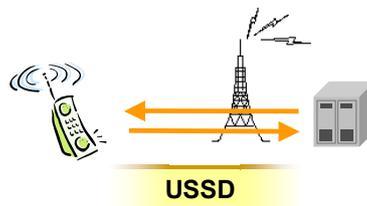Discover What's Possible™
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4-4. Testing USSD Function (1/4)

- USSD Functions
  - ♦ These functions are used from the UE to NW when performing carrier-related setting operations such as setting call forward and call hold functions.
  - ♦ By using the sample scenario source code and encode/decode tools, it is possible to easily change the USSD code, USSD procedure, etc.

USSD
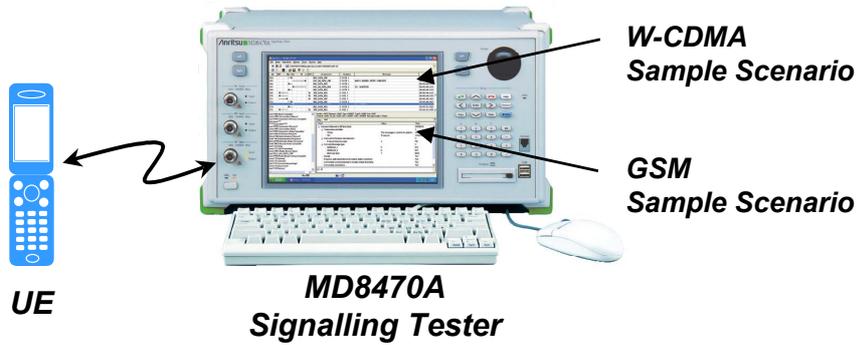
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4-4. Testing USSD Function (2/4)

- **<u>Required Hardware and Software</u>**

W-CDMA
Sample Scenario

GSM
Sample Scenario

UE

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4-4. Testing USSD Function (3/4)

- USSD Procedure
  - ✓ Register the location.
  - ✓ The USSD Notify (Facility:unstructuredSS-Notify) is terminated from the NW.
  - ✓ The mobile terminal behavior corresponding to the terminated USSD string is confirmed.

4-4. Testing USSD Function (4/4)

- **Use Scenario**
  - ◆ *W-CDMA Sample Scenario*
    - CS + PS/Registration/Combined Attach
    - CS/Operation/Idle – MO USSD (Response by Notify/Request)
    - CS/Operation/Idle – MT USSD (Notify/Request)
    - CS/Operation/AMR – MO USSD (Response by Notify/Request)
    - CS/Operation/AMR – MT USSD (Notify/Request)

  - ◆ *GSM Sample Scenario*
    - CS/Registration/Location Update
    - CS/Operation/Idle – MO USSD (Response by Notify/Request)
    - CS/Operation/Idle – MT USSD (Notify/Request)
    - CS/Operation/AMR – MO USSD (Response by Notify/Request)
    - CS/Operation/AMR – MT USSD (Notify/Request)

* The above W-CDMA/GSM Sample Scenarios are offered by web download service of MD8470A support service (MX847010A-20).

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5. Advantages of Using MD8470A

- ■ **No Dependence on Real Network**
  - Compared to testing using a real network, the MD8470A connection is more stable and the test results have high reproducibility so the test efficiency is good.

- ■ **Able to Retrieve and Analyze Wireless and SS Protocols**
  - ■ The wireless protocol and SS protocol logs can be saved during testing so problems can be analyzed easily.

- ■ **Use Sample Scenarios**
  - Since sample scenario source code[*] can be used when performing SS tests, test parameters and sequences for regular and irregular systems can be changed easily.

* The above W-CDMA/GSM Sample Scenarios are offered by web download service of MD8470A support service (MX847010A-20).

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Video Call

Voice Call

Packet Call

SMS

MMS

Supplementary Services

Browsing

Music

Game

Streaming

DRM

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Specifications are subject to change without notice.

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