APPLICATION NOTE

MD8470A
Signalling Tester
Supplementary Services

ANRITSU CORPORATION
MD8470A Signalling Tester Application Note
- Supplementary Services -

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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

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.

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
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.

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

- Required Hardware & Software
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]

![Diagram showing the procedure]

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]

![Diagram showing the procedure]
4-1. Testing Call Waiting/Call Hold Function (5/5)

- **Use Scenario**
  
  - **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.
4-2. Testing Multi-Party Function (2/4)

- Required Hardware and Software

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]
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.

\(\text{\footnotesize ※1: Displays Advice of Charge (Information)}\)
4-3. Testing Advice of Charge Function (2/4)

- Required Hardware and Software

- W-CDMA Sample Scenario
- GSM Sample Scenario

UE

MD8470A Signalling Tester

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]

Origination → ChargeAdvice → Disconnect

Charging Information

[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).

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

- Required Hardware and Software

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).

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).
Supplementary Services

- Video Call
- Voice Call
- Packet Call
- SMS
- MMS
- Browsing
- Music
- Game
- Streaming
- DRM