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Product Introduction

Anritsu

# MD8480C

## W-CDMA Signalling Tester

# MD8480C
# W-CDMA Signalling Tester
# Product Introduction

**Ver. 13.0**

## Anritsu Corporation

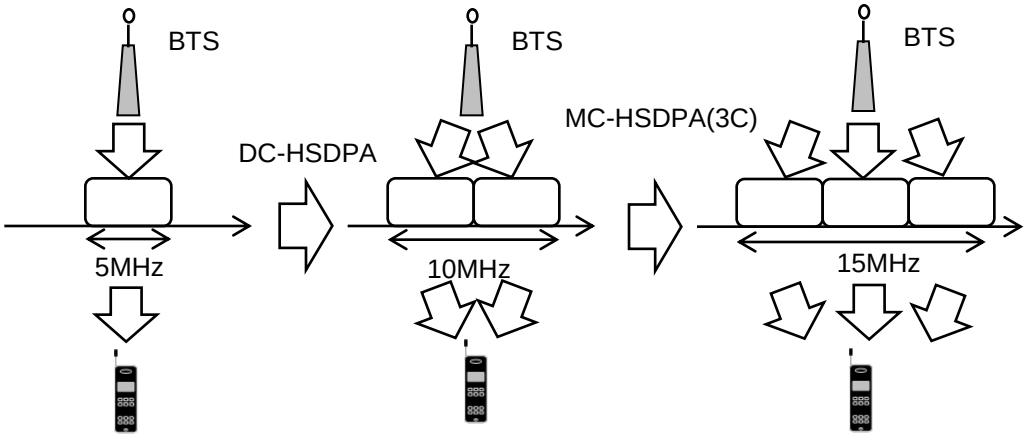
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- New Functionality
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- Applications
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- Configurations
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- Roadmap

# HSPA Evolution Function Overview (1/6)

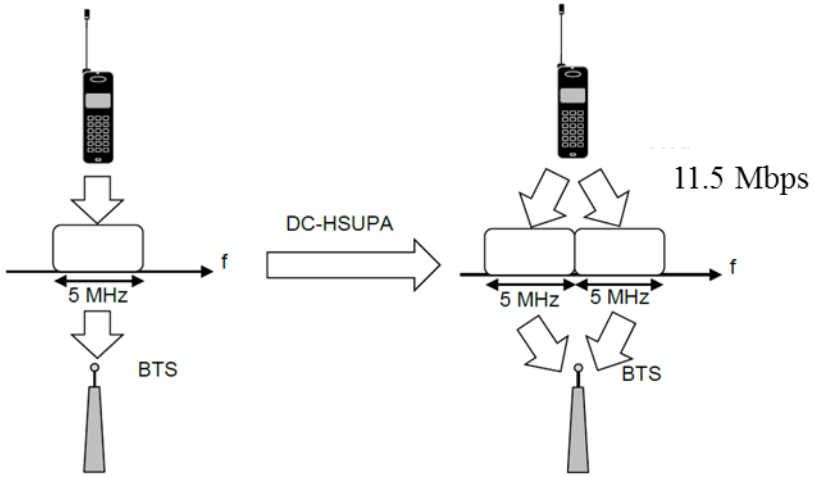
- 3GPP Release 10 Function
  - MC (Multi Carrier) - HSDPA (Release10)
    - MC-HSDPA is a new technology achieving higher packet communications by triple frequency bandwidth(5 MHz x 3) of existing HSDPA. It supports maximum data throughput 41.2 Mbps of 16QAM in DL (L1 supports Category 29 of DL 63.3 Mbps (64QAM) ).




**MC-HSDPA Operation Concept**

# HSPA Evolution Function Overview (2/6)

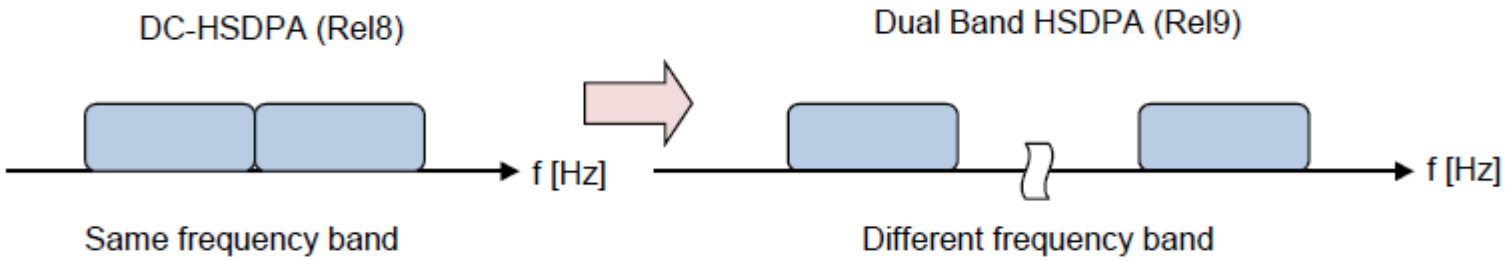
- 3GPP Release 9 Function
  - DC (Dual Cell) - HSUPA (Release9)
    - DC-HSUPA is capable of receiving UL data to be paired DC-HSDPA. It is a new technology achieving higher packet communications by doubled frequency bandwidth (5 MHz x 2) of existing HSUPA channel. It supports maximum data throughput 11.5 Mbps (Category 8) in UL (L1 supports Category 9).




DC-HSUPA Operation Concept

# HSPA Evolution Function Overview (3/6)

- 3GPP Release 9 Function
  - DB-DC (Different Bands for Dual Cell) HSDPA (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.

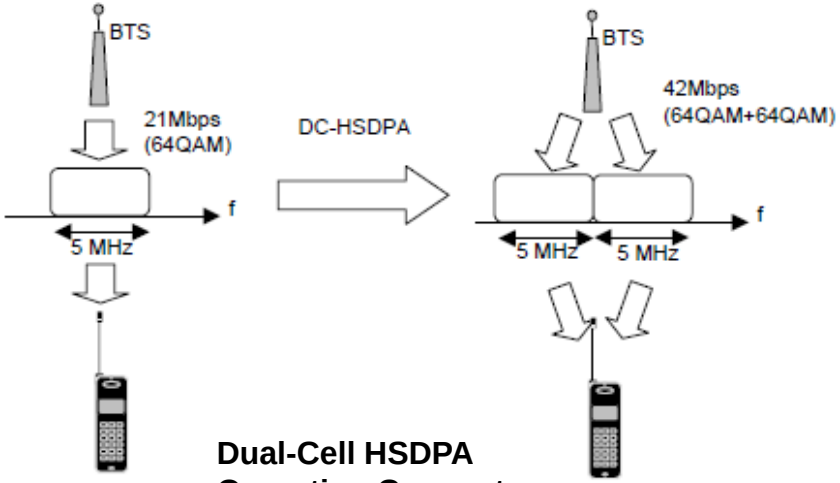



**Dual-Band HSDPA Concept**


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# HSPA Evolution Function Overview (4/6)

- 3GPP Release 8 Function
  - 64QAM and MIMO
    - Enables maximum 42 Mbps download speed combined with 64QAM and MIMO specified by UE Category 20
  - DC-HSDPA (Dual Cell HSDPA) *1
    - Supports maximum download speed of 42 Mbps with dual cells (carrier) using doubled bandwidth (5 MHz x 2) of HSDPA




**Dual-Cell HSDPA Operation Concept**

*1 : Supports dual-cell with adjacent carrier.

# HSPA Evolution Function Overview (5/6)

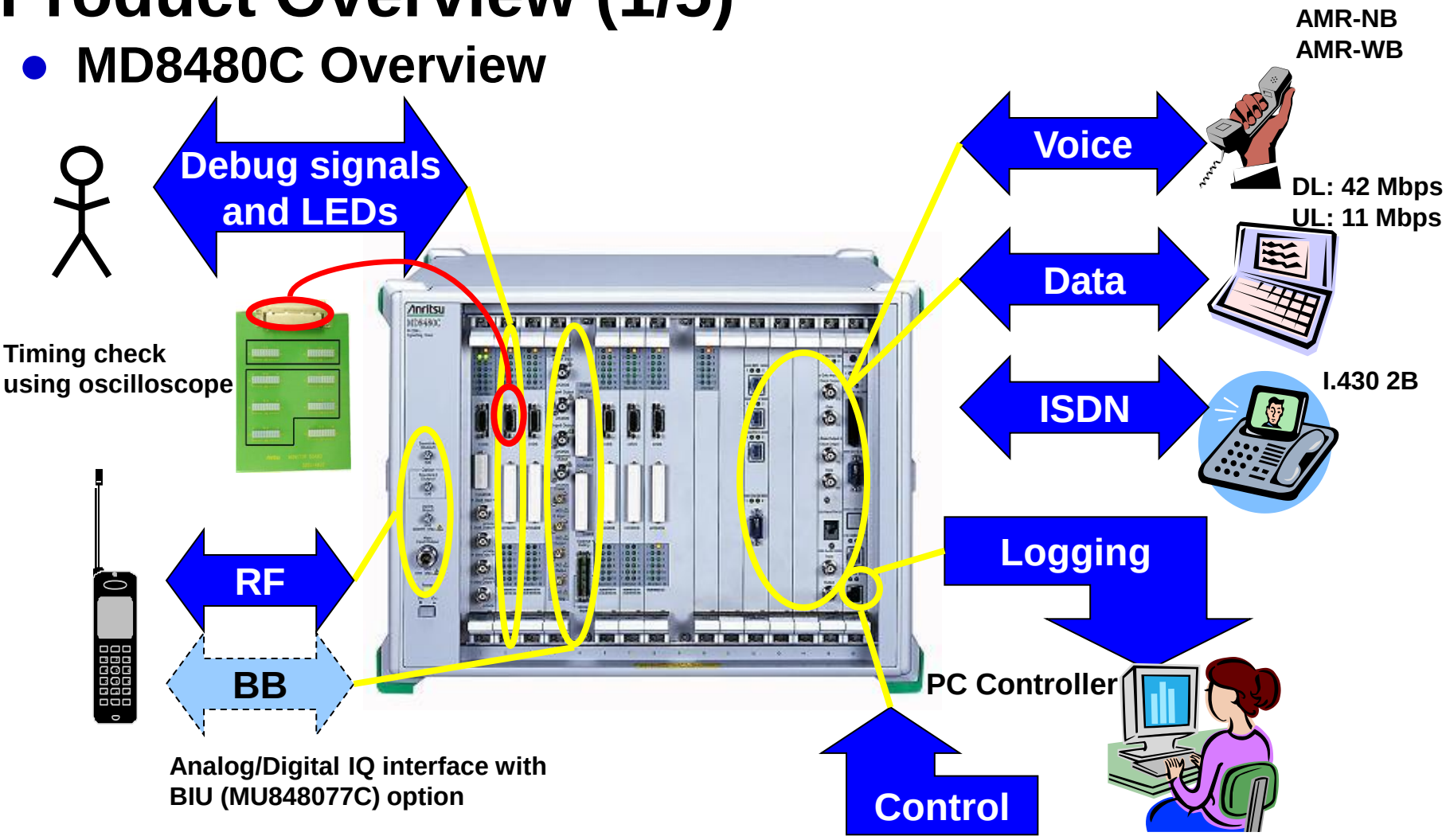
- 3GPP Release 8 Function
  - CS Voice over HSPA
    - Voice communication functionality using DL_HS-DSCH and UL_E-DCH
  - Improved L2 for UL
    - Realizes flexible RLC PDU size to reduce overhead and padding
  - Enhanced UL for CELL_FACH state
    - Enables use of E-DCH channels in non CELL_DCH states, to reduce latency and increase peak data rate
  - HS-DSCH Serving Cell Change Enhancement
    - A function for changing current serving cell to the high quality radio link rapidly

# HSPA Evolution Function Overview (6/6)

- HSPA Evolution Function
  - Higher-Order Modulation
    - High-speed data transfer with higher multilevel modulation scheme
      - DL 64QAM &UL 16QAM (4PAM)
  - 2x2 MIMO (Multiple Input Multiple Output)
    - Supports doubled transmission speed by splitting Tx data into two streams and sending each stream simultaneously using multiple antennas
      - Retransmission Control
      - Single and Dual Stream
      - Stream Schedule Function for Testing

# Product Overview (1/5)

- MD8480C Overview

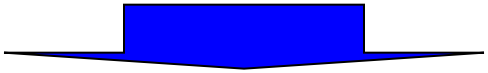





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# Product Overview (2/5)

- W-CDMA Signalling Tester Concept
  - UE Specifications based on standards (e.g. 3G UE => 3GPP standard)
  - UE Development based on standards
  - Developers simulate BTS connections to verify operation of developed UE
  - Important protocol stack verification and overall UE operation testing



**Anritsu offers W-CDMA Signalling Tester simulating call processing of real UMTS/GSM network for mobile terminals.**

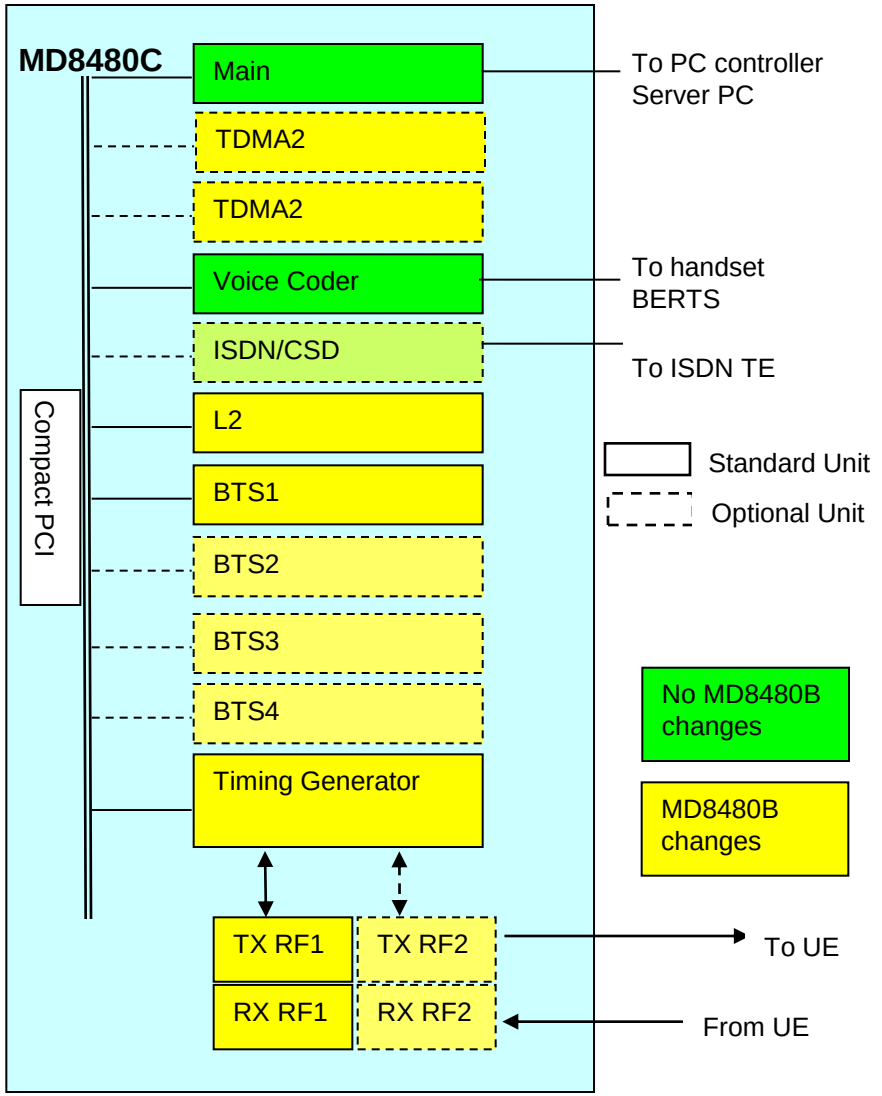
# Product Overview (3/5)

- **What is MD8480C?**
  - **The MD8480C is a base station simulator for testing 3.5G W-CDMA/ GSM mobiles with HSPA (including HSPA Evolution) functions**
  - **It has a 3GPP-compliant air interface supporting a full range of application tests, such as chipset and mobile station coding/decoding processing, voice calling, and packet communications as well as MS-to-MS testing (requires two MD8480C units). MD8480C protocol sequence tests include position registration, origination/termination, handover (option), and disconnection from mobile station/network**
  - **Handover tests between W-CDMA/HSPA and GSM/GPRS/EGPRS BTS can be performed by adding optional functions for 2G. The MD8480C is ideal for developing UMTS/GSM mobiles and chipsets**

# Product Overview (4/5)

- Block Diagram
  - Basic spec overview (1)

**Comm. Speed: DL 42 Mbps*1 max.**
**UL 11 Mbps*2 max.**
**Number of BTS: 4 BTS (W) 2 BTS (G) max.**
**Modulation: QPSK/16QAM/64QAM**
**Demodulation: BPSK/4PAM**
**SHO: Soft/Softer handover (4 branches),**
**Tx diversity (2 branches)**
**HHO: Inter-frequency HHO**
**Tx Diversity: STTD, TSTD, Closed Loop Mode 1, 2**
**Rx Diversity: Supported**
**Compressed Mode: SF/2, Puncturing, Higher Layer Scheduling**
**TE Connection:**
**AMR Speech (for voice)**
**ISDN (for videophone, etc.)**
**Server PC (for data)**




*1: 63 Mbps for L1 testing
*2: 23 Mbps for L1 testing

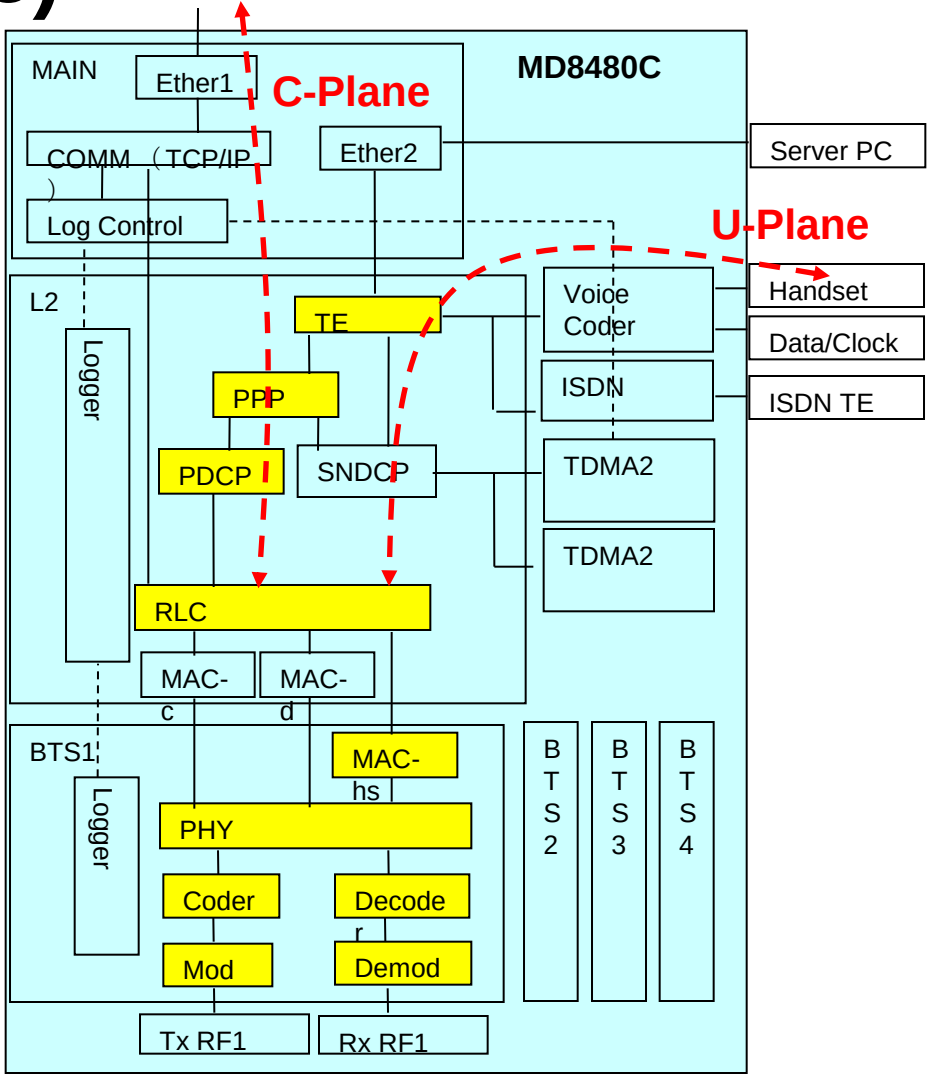


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# Product Overview (5/5)

- Block Diagram
  - Basic spec overview (2)

TE: PN, fixed pattern transmission
TE connection
Handset, ISDN, Server PC, etc.
PPP: RFC1661
PDCP: TS25.323 compliant
RLC: TS25.322 compliant
MAC
MAC-c/d:
TS25.321 compliant
MAC-ehs:
TS25.321 compliant
PHY:
AMR Speech
AV64K, UDI, AV32K
Packet (DCH) DL32K, 128K, 384K, UL64K
Packet (HSDPA) ~ 63 Mbps
Packet (HSUPA) ~ 23 Mbps
Multi Call
AMR Speech + Packet (DCH)
AMR Speech + Packet (HSPA), etc.

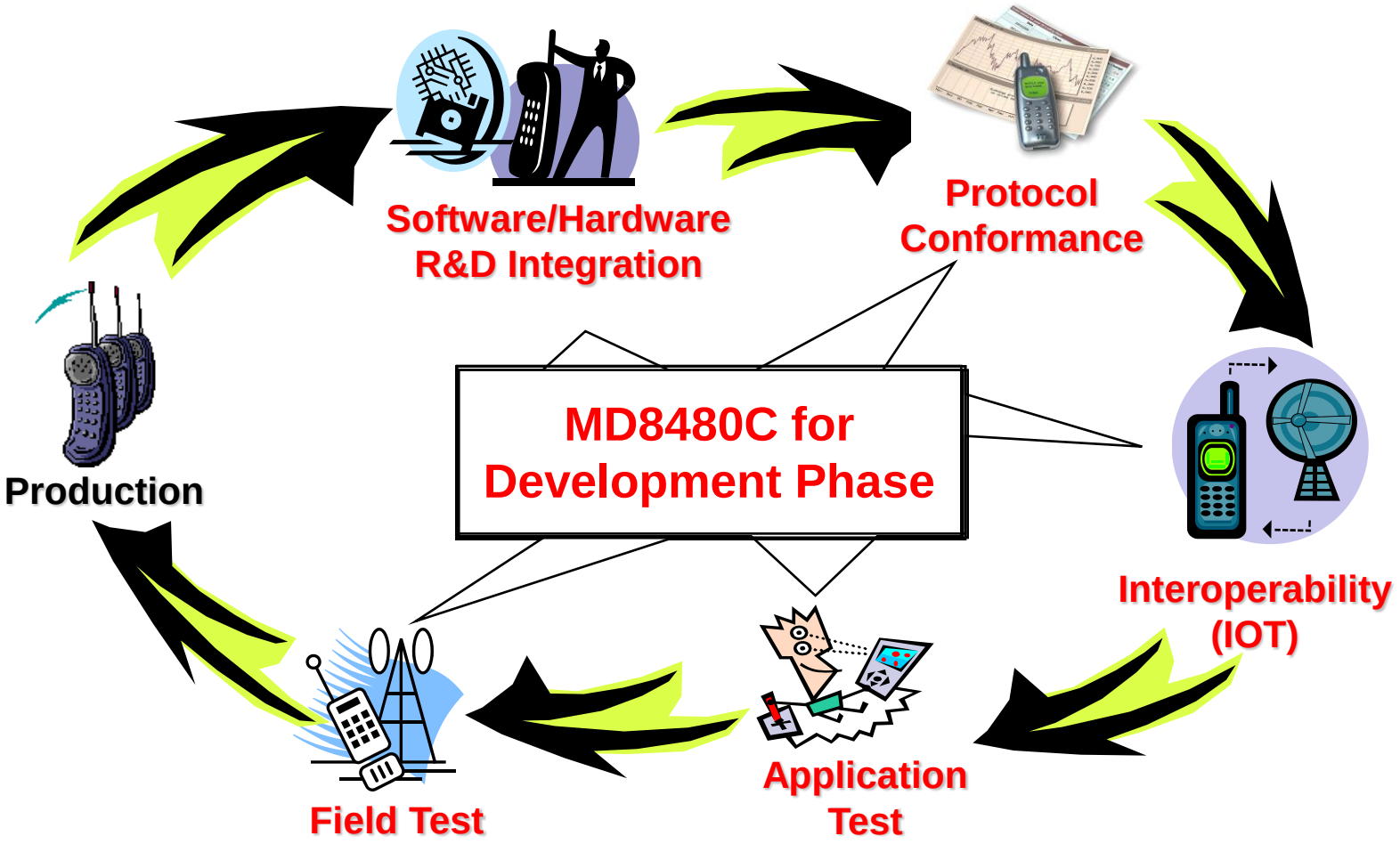




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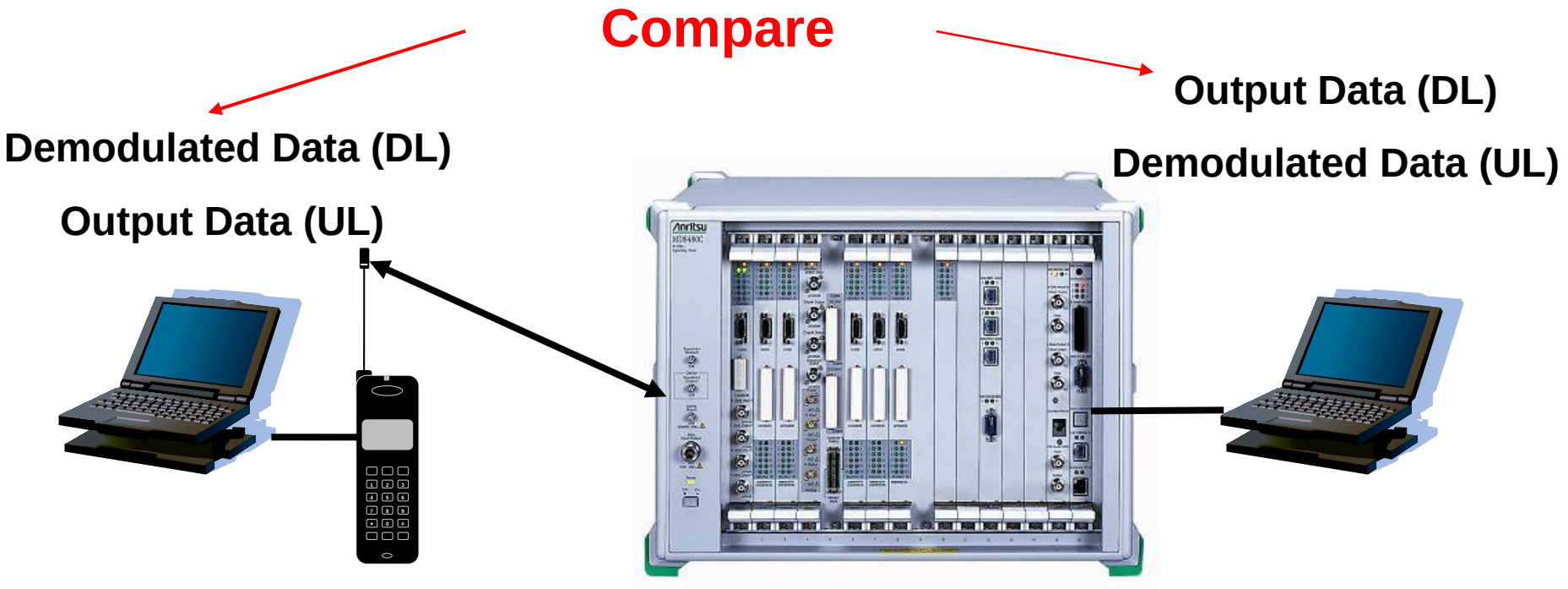
# Applications (1/9)

- UE Development Cycle and MD8480C



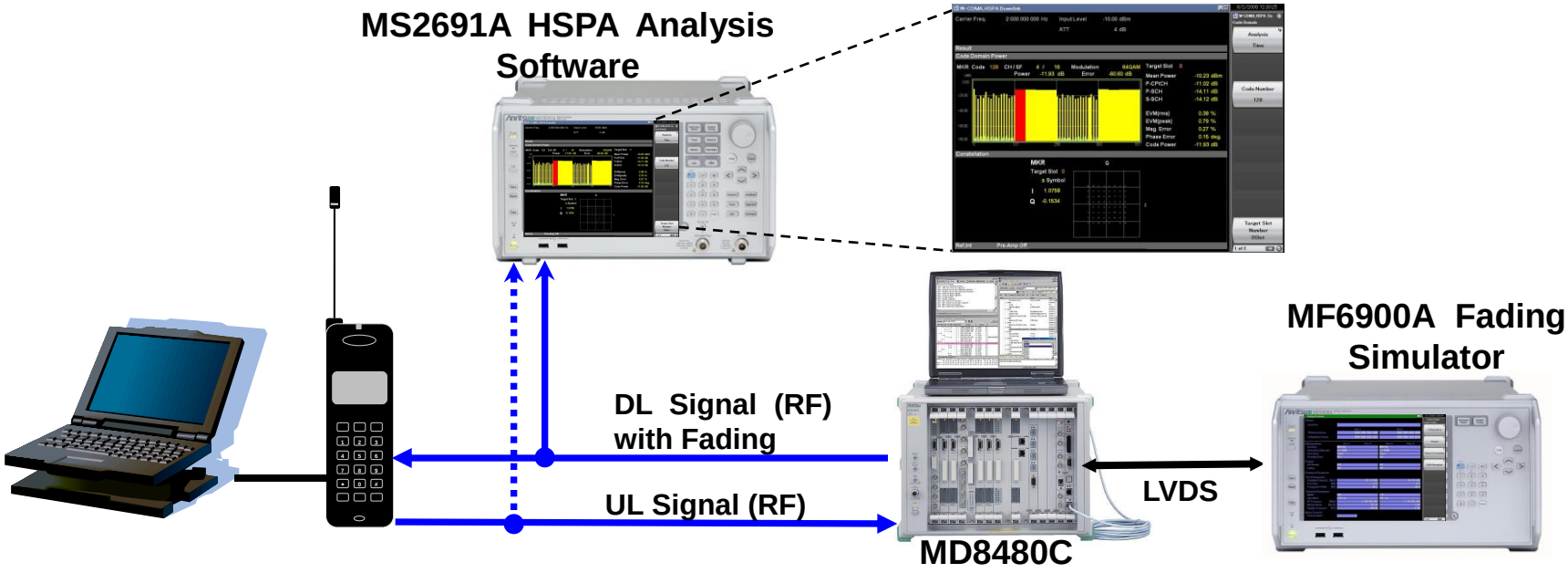
# Applications (2/9)

- Coding Decoding Test
  - UE Coding/Decoding functions tested using following setup



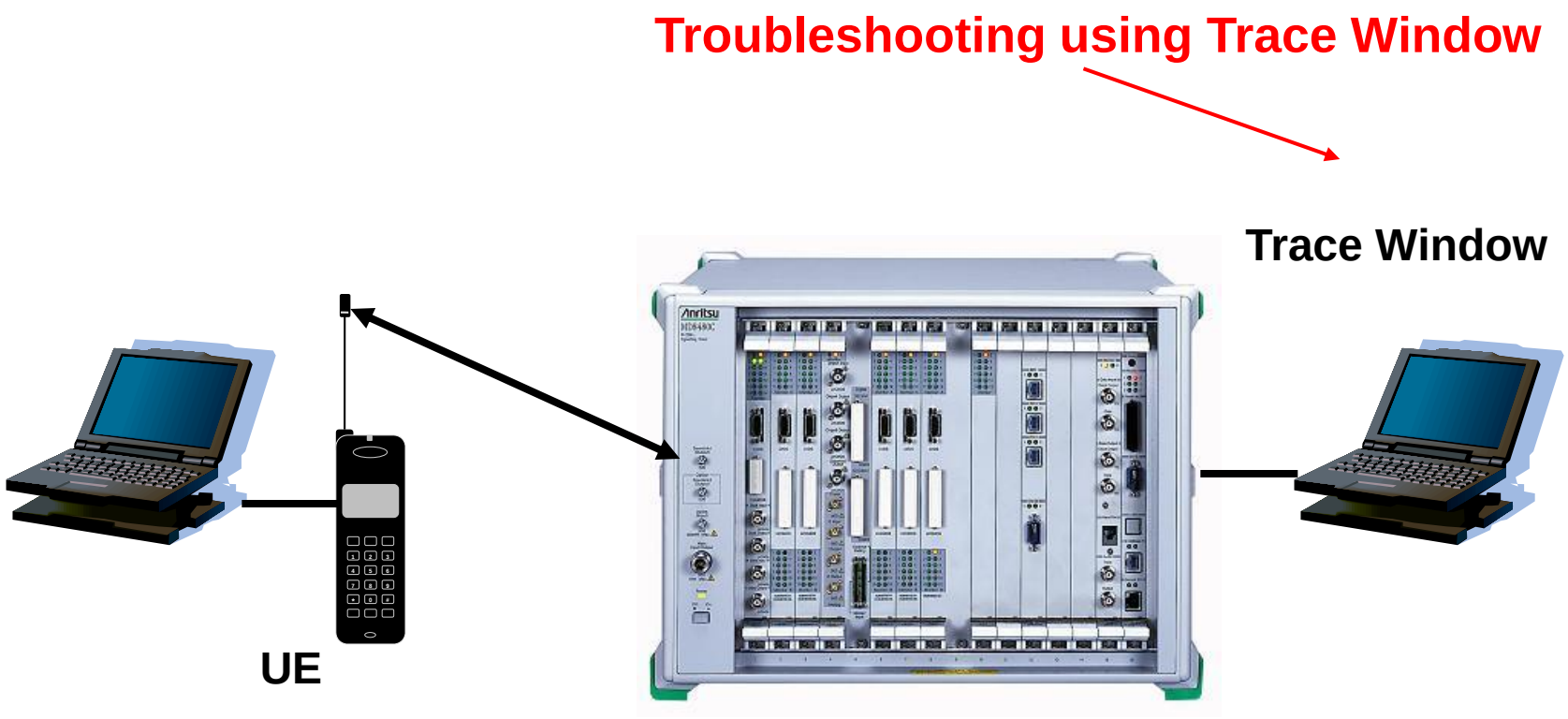
# Applications (3/9)

- Coding Decoding Test
  - Can visually check UE operations at dynamic propagation conditions (such as CQI acknowledgement to BTS) combined with MF6900A Fading Simulator.
  - DL and UL constellation and power variation monitored using MS2691A Signal Analyzer



# Applications (4/9)

- Protocol Sequence Test
  - UE Call Processing tests performed using following setup.



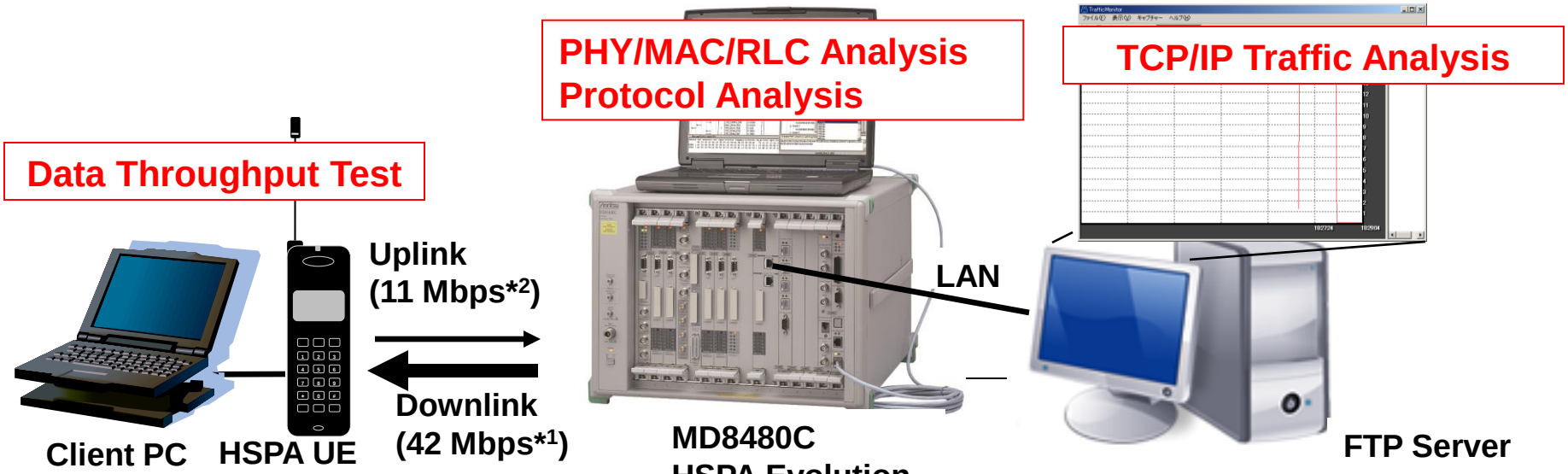
# Applications (5/9)

- **Application Tests A**
  - **The MD8480C simulates these various applications.**

- **AMR Voice Test**: A handset is connected to the MD8480C to perform a voice test between MS and MD8480C.
- **User Data Test**: Any data can be inserted into the transmitted DTCH and the demodulated DTCH data is output externally. This is effective for measuring bit error rate.
- **IP Packet Test**: A PC with 10BASE-T I/F is connected to the MD8480C to test the IP protocol data communications.
- **PPP Packet Test**: A PC with RS-232C I/F is connected to the MD8480C to test the PPP protocol data communications.
- **PPP (Built-in Server) Test**: The MD8480C with PPP protocol stack acts as the PPP terminal. The PC connected via 10BASE-T I/F supports high-speed services up to 42 Mbps (HSDPA) and 11 Mbps (HSUPA).
- **ISDN Test (Option)**: A videophone or other ISDN device is connected to the MD8480C to test video and audio communications between the MS and MD8480C.
- **MS-to-MS Test (requires two MD8480C units)**: End-to-end communication tests can be performed between two MS sets by connecting two MD8480C units via 10BASE-T.

# Applications (6/9)

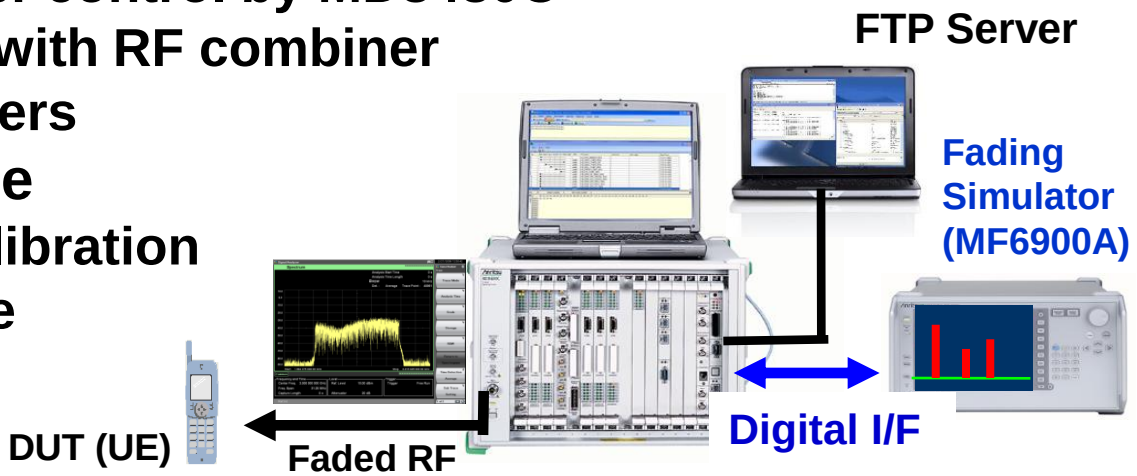
- Application Tests B
  - IP Packet Test Example
    - Throughout tests using external FTP server
    - Layer 1, Layer 2 Trace Log and Throughput Monitor
    - TCP/IP Traffic Analysis using general analysis software




*1: 63 Mbps for L1 testing
*2: 23 Mbps for L1 testing

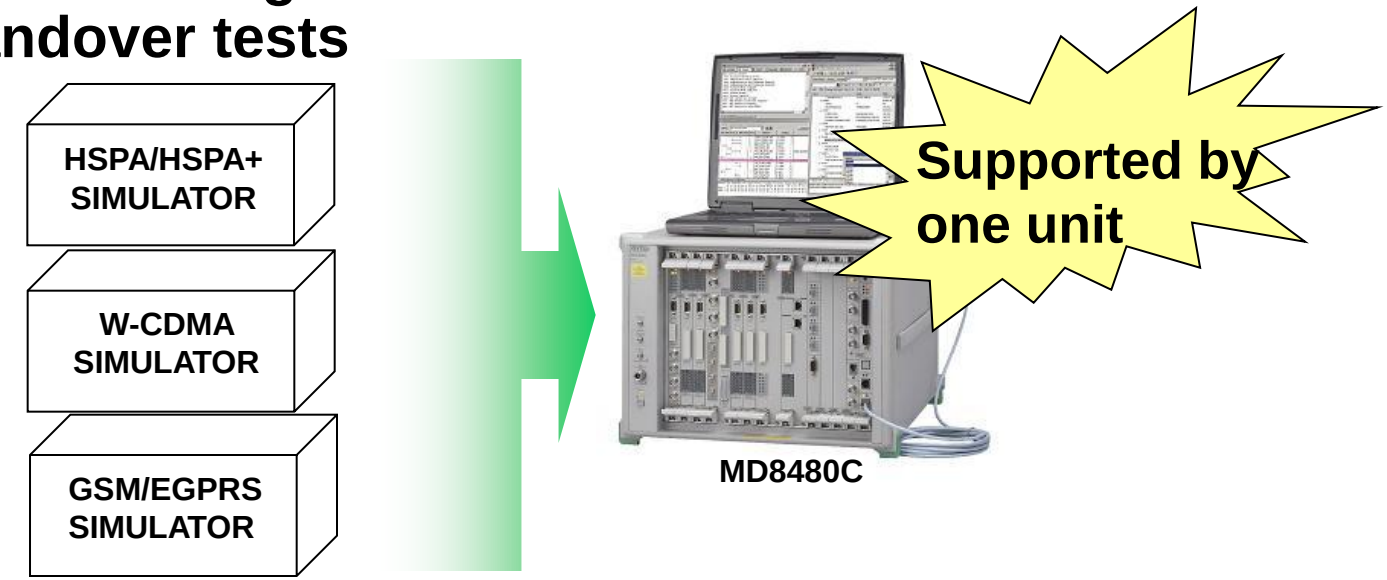
# Applications (7/9)

- Fading Performance Test
  - Simple Performance (RF & Throughput) Test Solution
    - Combined with Anritsu MF6900A Digital Fader
  - High Reproducibility
    - Stable fading test using digital baseband interface
  - Easy Operation
    - Standard 3GPP TS25.101, TS34.121-1 fading profiles
    - Easy profile setting from test scenarios
    - Direct RF power control by MD8480C
    - No calibration with RF combiner and power meters
  - Free Maintenance
    - No periodic calibration
    - Low failure rate



# Features (1/5)

- One Unit Supports Latest 2/3/3.5G Mobile Technology including HSPA Evolution
  - Small footprint with expanded functions for testing up to four HSPA/WCDMA base stations including HSPA Evolution
  - One unit supports up to two GSM/GPRS base stations including EGPRS for Inter-RAT and Intra-RAT handover tests

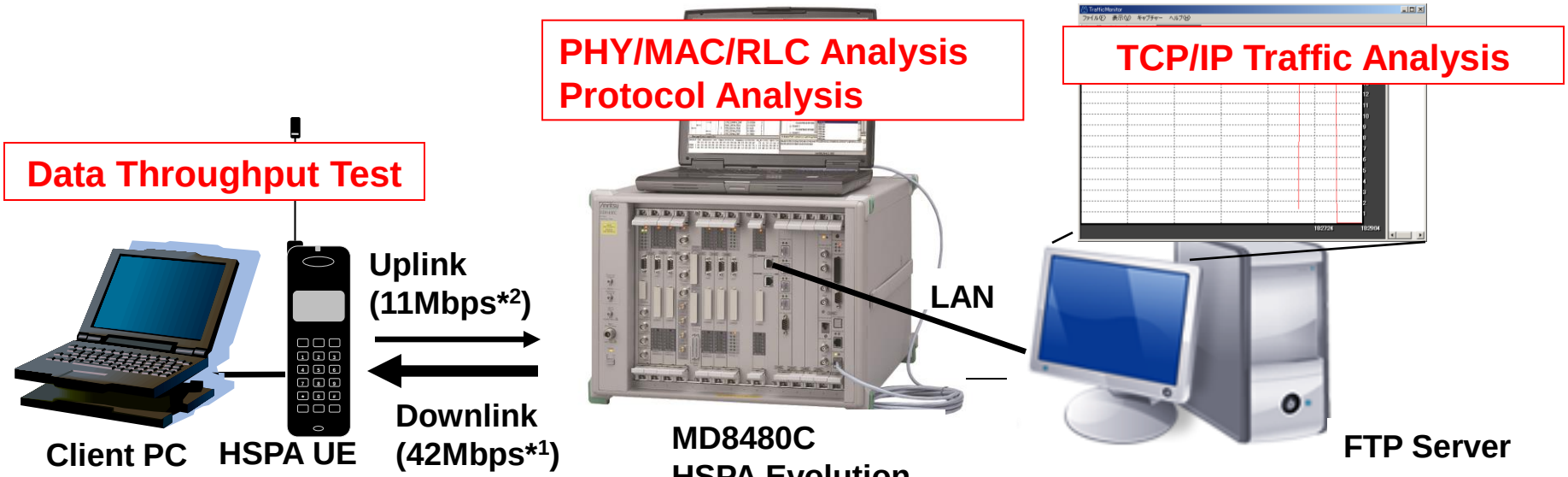




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# Features (2/5)

- Supports DL 42 Mbps*1 Data Throughput (with MC-HSDPA) Specified by 3GPP Rel-10
  - Throughout tests using external FTP server
  - Layer 1, Layer 2 Trace Log and Throughput Monitor
  - TCP/IP Traffic Analysis using general analysis software




*1: 63 Mbps for L1 testing
*2: 23 Mbps for L1 testing

# MD8480C W-CDMA Signalling Tester

## Features (3/5)

- **Supports 3GPP Rel-7 and Rel-8 UE Categories**
  - **New hardware supporting DL 64 QAM, and UL 16 QAM modulation schemes as well as 2x2 MIMO**
  - **Supports 64QAM and MIMO (Category 20) , DC-HSDPA (Category 24), DB-DC-HSDPA (Category 24)**
  - **Supports DC-HSDPA with MIMO (Cat. 26*1)**
  - **Supports DC-HSUPA (UL Cat. 8)**
  - **Supports MC-HSDPA (Cat. 29*1)**

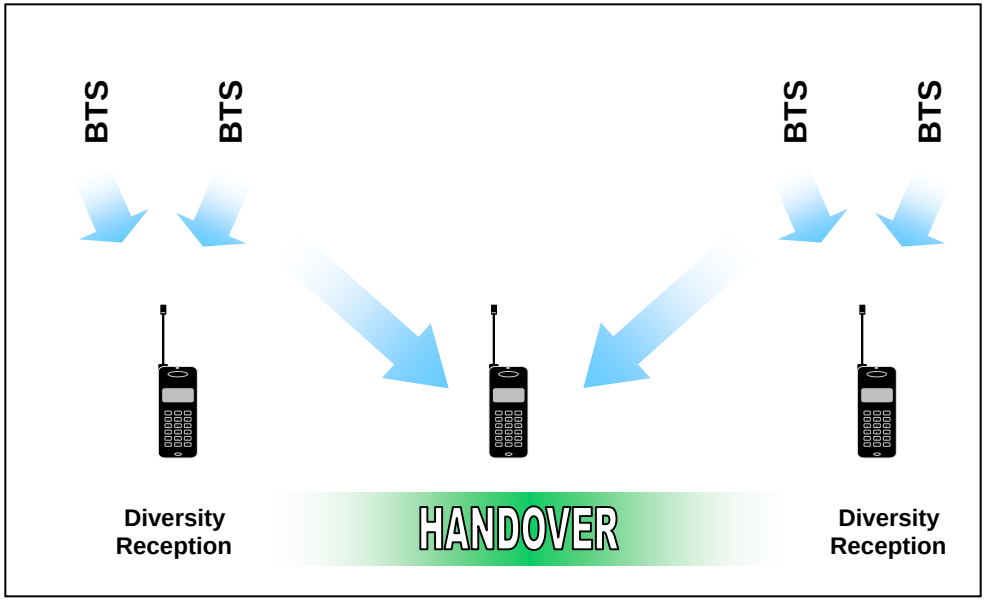
*1 : Limitation Max Throughput

3GPP TS.25.306 V10.10.0 (Release 10) Table 5.1a: FDD HS-DSCH physical layer categories

| HS-DSCH category | Maximum number of HS-DSCH codes received | Minimum inter-TTI interval | Maximum number of bits of an HS-DSCH transport block received within an HS-DSCH TTI | Total number of soft channel bits | Total Number of Serving/Secondary serving HS-DSCH | Supported modulations without MIMO operation or aggregated cell operation | Supported modulations with MIMO operation and without aggregated cell operation | Supported modulations without MIMO operation with aggregated cell operation | Supported modulations with MIMO operation and aggregated cell operation | Maximum Throughput [bits/s] |
|---|---|---|---|---|---|---|---|---|---|---|
| Category 13 | 15 | 1 | 35280 | 259200 | 1 | QPSK, 16QAM, 64QAM | Not Applicable (MIMO not supported) | Not Applicable (aggregated carriers operation not supported) | Not applicable (simultaneous aggregated carriers and MIMO operation not supported) | 17,640,000 |
| Category 14 | 15 | 1 | 42192 | 259200 | 1 | | | | | 21,096,000 |
| Category 15 | 15 | 1 | 23370 | 345600 | 1 | QPSK, 16QAM | | | | 11,685,000 |
| Category 16 | 15 | 1 | 27952 | 345600 | 1 | | | | | 13,976,000 |
| Category 17 | 15 | 1 | 35280 | 259200 | 1 | QPSK, 16QAM, 64QAM | – | | | 17,640,000 |
| | | | 23370 | 345600 | 1 | – | QPSK, 16QAM | | | 23,370,000 |
| Category 18 | 15 | 1 | 42192 | 259200 | 1 | QPSK, 16QAM, 64QAM | – | | | 21,096,000 |
| | | | 27952 | 345600 | 1 | – | QPSK, 16QAM | | | 27,952,000 |
| Category 19 | 15 | 1 | 35280 | 518400 | 1 | QPSK, 16QAM, 64QAM | | | | 35,280,000 |
| Category 20 | 15 | 1 | 42192 | 518400 | 1 | | | | | 42,192,000 |
| Category 21 | 15 | 1 | 23370 | 345600 | 2 | – | – | QPSK, 16QAM | | 23,370,000 |
| Category 22 | 15 | 1 | 27952 | 345600 | 2 | | | | | 27,952,000 |
| Category 23 | 15 | 1 | 35280 | 518400 | 2 | | | QPSK, 16QAM, 64QAM | | 35,280,000 |
| Category 24 | 15 | 1 | 42192 | 518400 | 2 | | | | | 42,192,000 |
| Category 25 | 15 | 1 | 23370 | 691200 | 2 | – | – | – | QPSK, 16QAM | 46,740,000 |
| Category 26 | 15 | 1 | 27952 | 691200 | 2 | | | | | 55,904,000 |
| Category 27 | 15 | 1 | 35280 | 1036800 | 2 | – | – | – | QPSK, 16QAM, 64QAM | 70,560,000 |
| Category 28 | 15 | 1 | 42192 | 1036800 | 2 | | | | | 84,384,000 |
| Category 29 | 15 | 1 | 42192 | 777600 | 3 | | | QPSK, 16QAM, 64QAM | – | 63,288,000 |

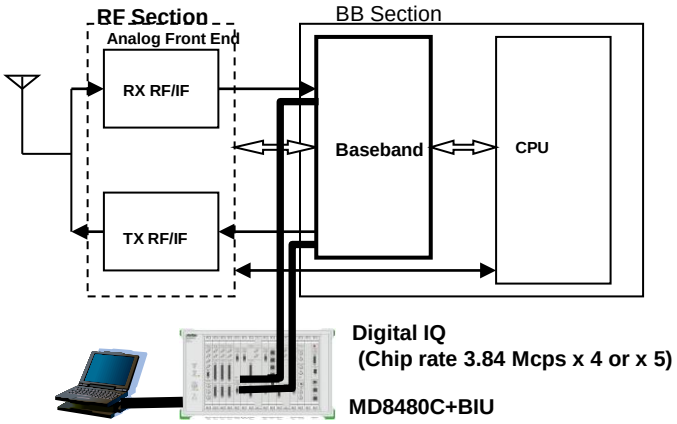
# Features (4/5)

- Diversity Support for Four BTS (max.)
  - Built-in support for handover tests between four BTS with diversity reception to simulate handover tests in near-to-real network environment
  - Field verification items can be bench-tested, reducing time in field testing



# Features (5/5)

- **Strong Baseband Support**
  - **The optional Baseband Interface Unit (MU848077C) supports stable W-CDMA/HSPA chipset performance and function evaluation tests irrespective of the of RF section performance**
  - **Development of HSPA mobiles requiring performance evaluation in severe mobile environments is supported by configuration of a high-reproducibility coding/decoding test environment**

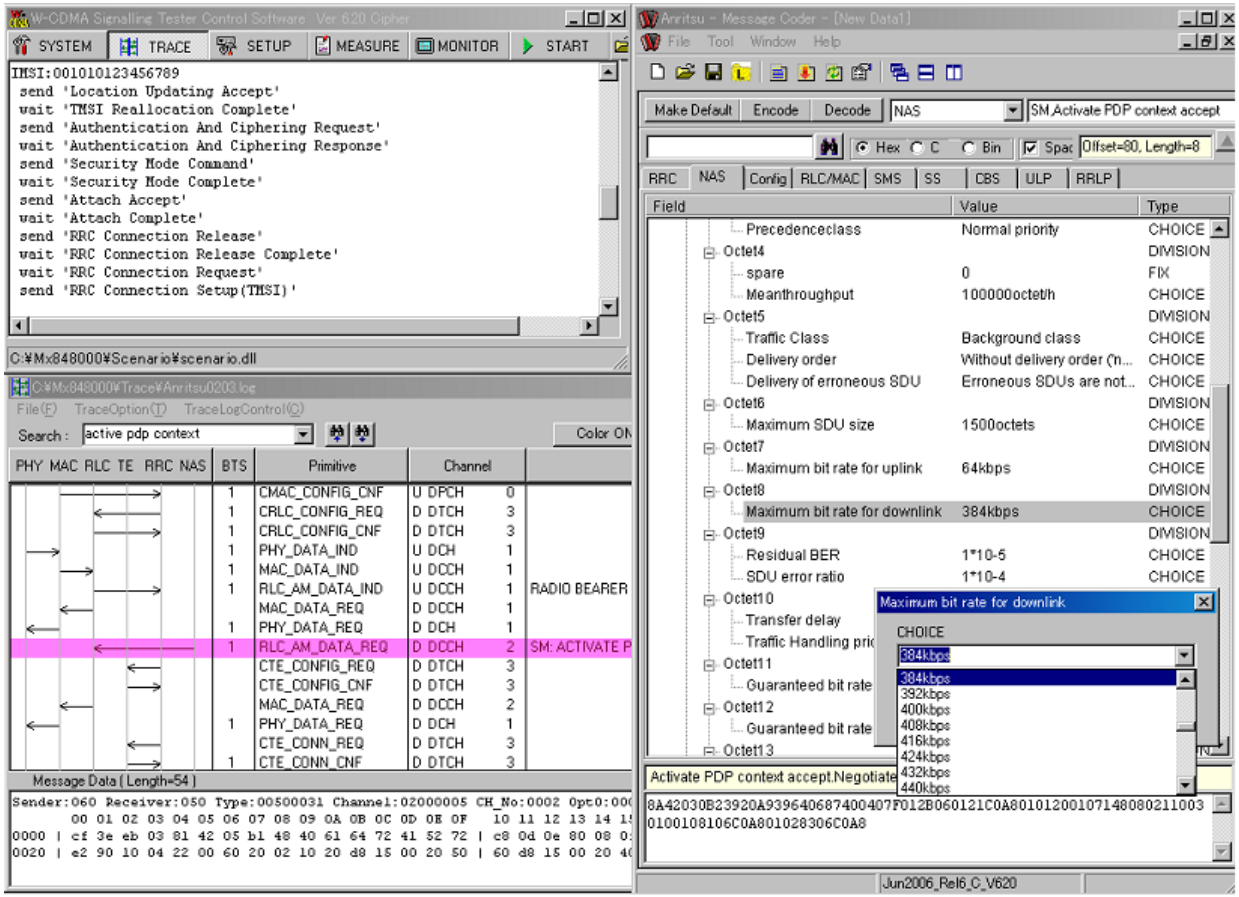


# Functions (1/6)

- Main MD8480C Functions
  - 3GPP-compliant BTS simulator
  - Supports W-CDMA including HSPA Evolution and GSM/GPRS/EGPRS
  - Expandable to 4 WCDMA or 2 GSM cells with 2RF
  - Supports Layer 1 and Layer 2
  - Supports editing of Layer-3 protocol sequences controlling Layer 1 and Layer 2 as required
  - Supports monitoring data exchange between MD8480C and UE, and other parameters, such as communication status

# Functions (2/6)

- PC Controller Window
  - Controls and configures MD8480C main frame

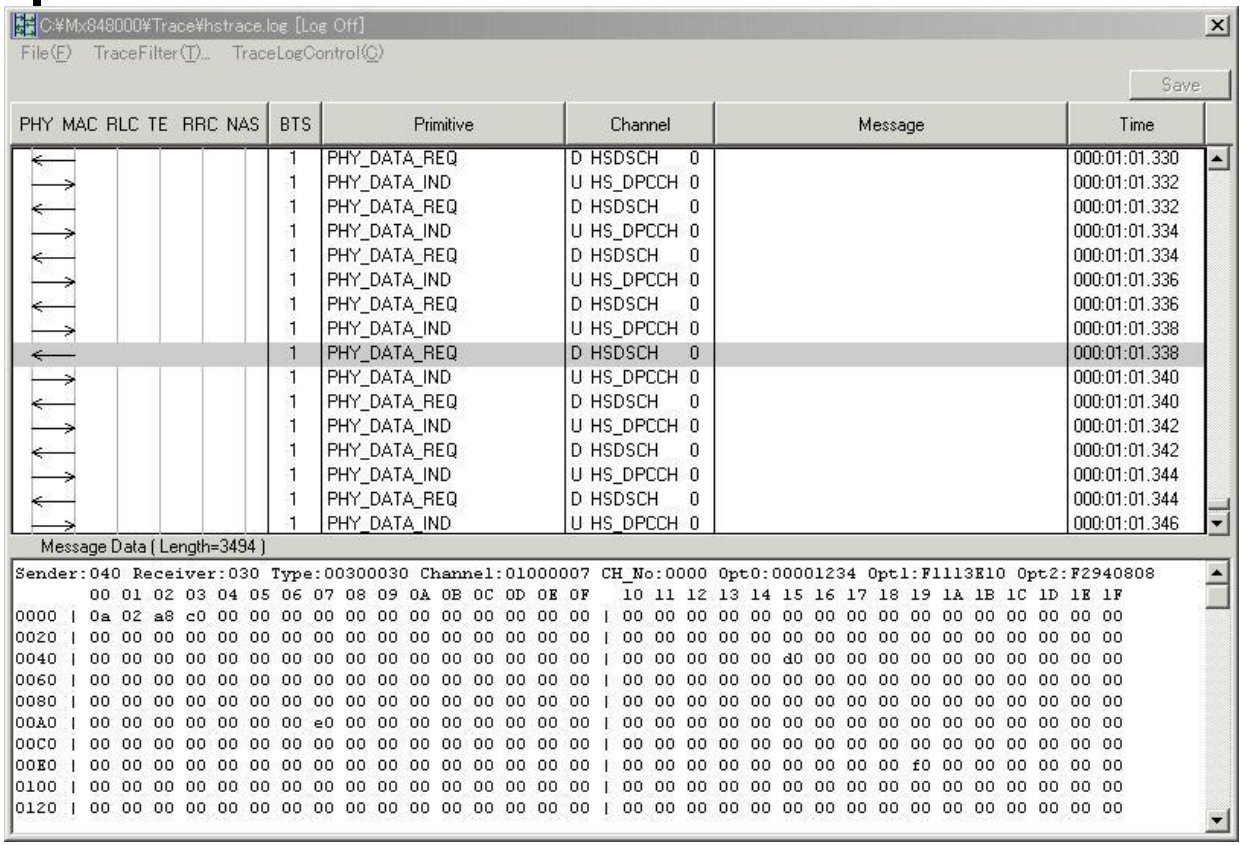





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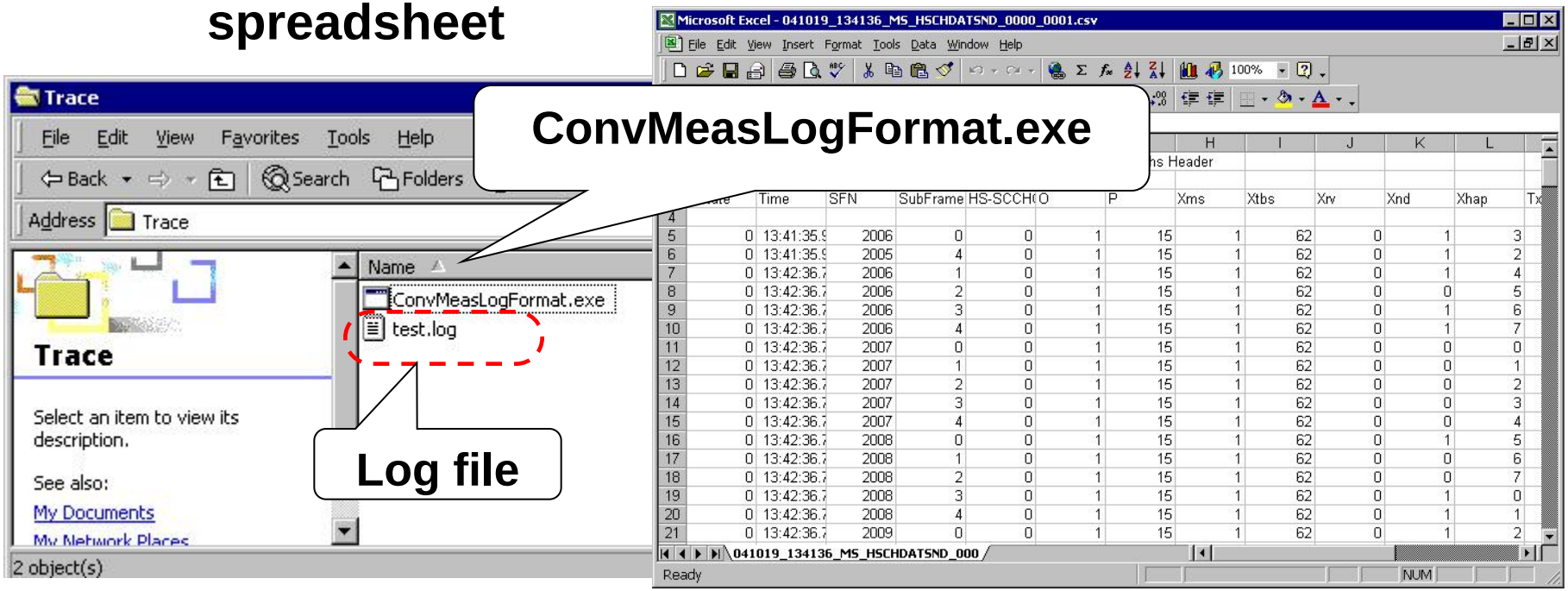
# Functions (3/6)

- Trace Functions A
  - Checks message exchange between layers and test sequence



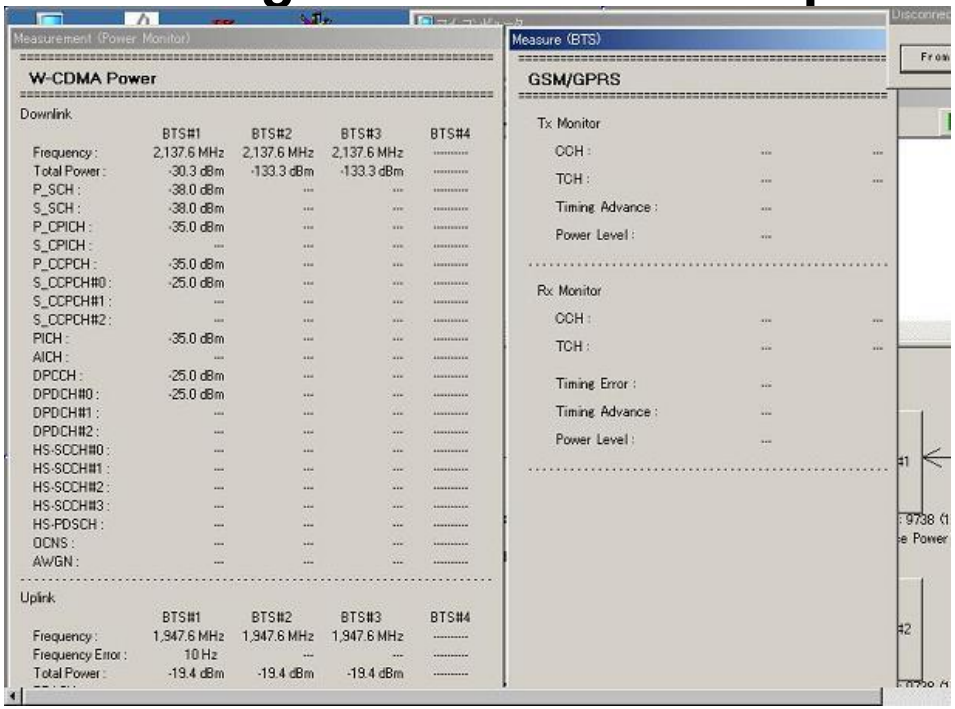
# Functions (4/6)

- Trace Functions B
  - Saves and analyzes trace log data up to specified capacity
  - Outputs HS-DSCH parameters generated in CSV format by standard tool and analyzes using spreadsheet



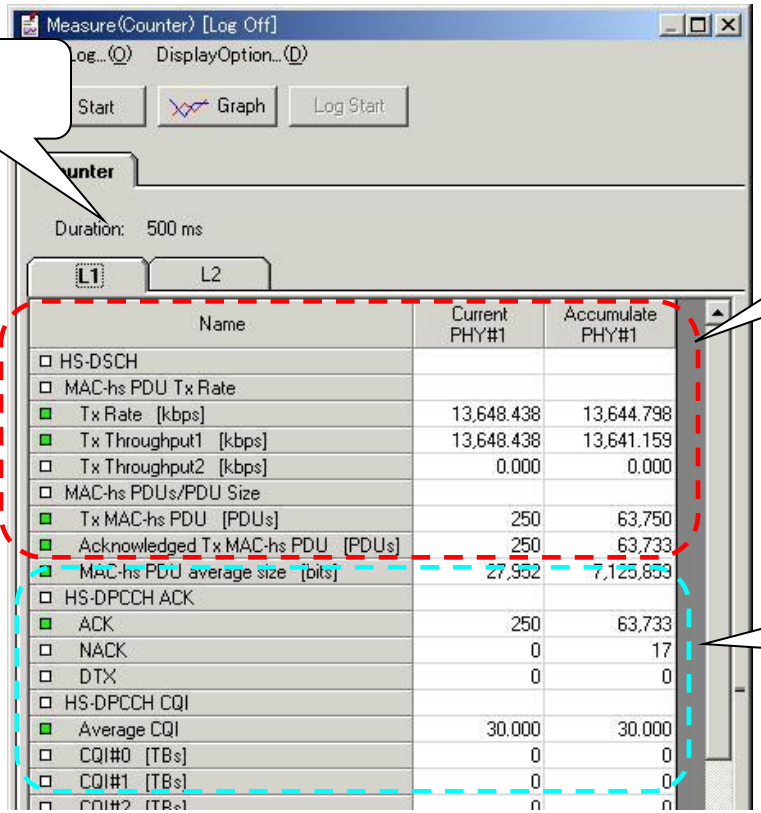
# Functions (5/6)

- Monitor Function
  - Monitors frequencies and powers per BTS or channel in real time
  - Saves monitor data to log file and checks frequency and power changes at each test step



# Functions (6/6)

- Measure (Counter) Function
  - Analyzes HSDPA parameters in real time
  - Saves result to log file



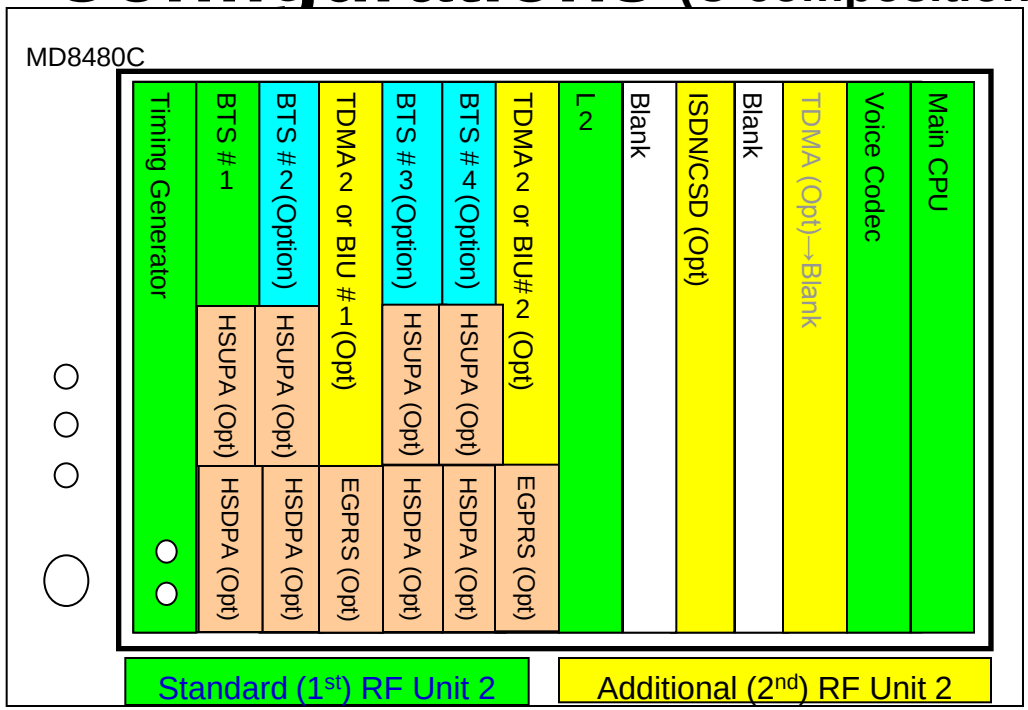

L1

**HS-DSCH**
MAC-hs PDU Tx Rate
Tx Rate [Kbps]
Tx Throughput 1 [Kbps]
MAC-hs PDUs/PDU Size
Tx MAC-hs PDU
:
:

**HS-DPCCH ,**
HS-DPCCH ACK
ACK
NACK
DTX
HS-DPCCH CQI
Average CQI
CQI#0 [TBs]
CQI#1 [TBs]
:
:
CQI#30 [TBs]
:
:

# MD8480C W-CDMA Signalling Tester

## Configurations (C-composition)




**Standard Unit**

**Add. Unit (Option)**

**Add. BTS Unit (Option)**

**MD8480C Standard Configuration (W-CDMA 1 BTS included)**

-MU848051A: CPU
-MU848056A: Voice codec
-MU848071C: L2
-MU848072C1: BTS Unit
-MU848073C: Timing Generator
-Z1189A: MD8480C 1st RF Unit 2

**Additional Units (Option)**

-MD8480C-03: Additional RF Unit 2
-MU848060C: TDMA2 (for GSM/GPRS/EGPRS)
-MU848060C-01: EGPRS (R99)
-MU848055C: ISDN/CSD
-MU848077C: Baseband Interface Unit

**Additional BTS Units (Option)**

-MU848072C1: BTS Unit (for BTS #2-4)
-MU848072C-01: HSDPA (for BTS #1-4)
-MU848072C-02: HSUPA (for BTS #1-4)

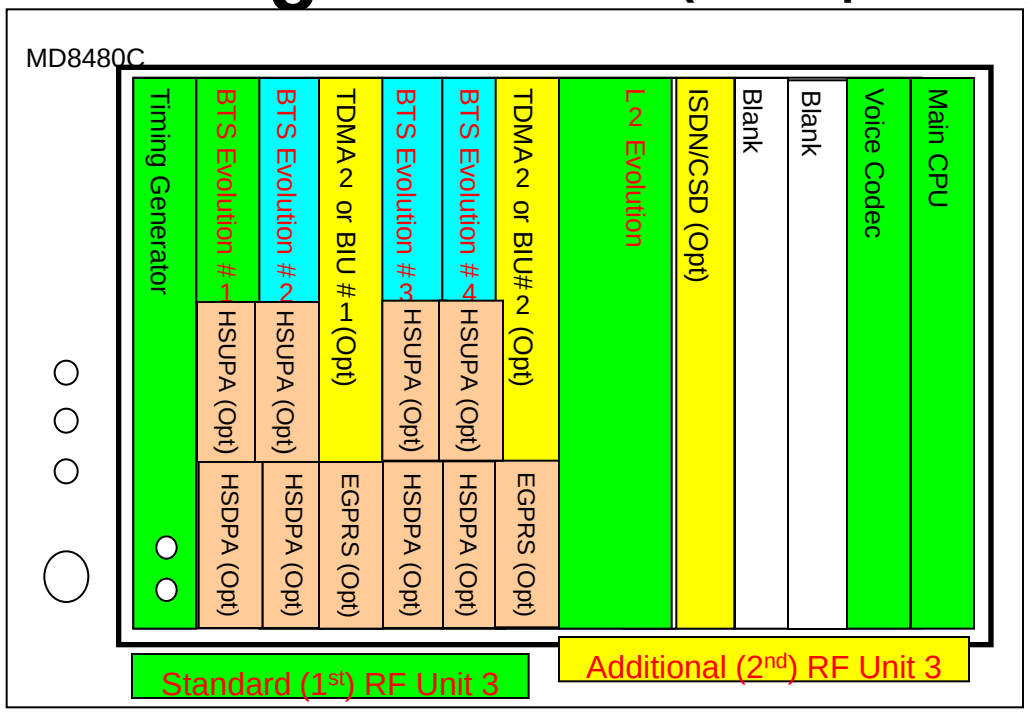
**Software Options**

-MX848001A-01: Tx Diversity
-MX848001C-11: HSDPA Tx Diversity
-MX848001A-02: Compressed Mode
-MX848001A-03: Router Connection
-MX848001A-04: GSM CSD
-MX848001A-05: GSM Frequency Hopping
-MX848001A-06: W-CDMA CSD
-MX848001A-07: Message Encoder/Decoder
-MX848001C-12: HSPA Evolution
-MX848001C-30: DTM (R99)
-MX848041C: Ciphering (for W-CDMA)
-MX848041C-10: HSDPA Ciphering
-MX848045C: GSM/GPRS Ciphering

**March 29, 2013 last day of order entry**

# MD8480C W-CDMA Signalling Tester

## Configurations (E-composition)




**MD8480C Standard Configuration (W-CDMA 1 BTS included)**

-MU848051A: CPU
-MU848056A: Voice codec
-MU848071E: L2 Evolution
-MU848072E: BTS Evolution
-MU848073C: Timing Generator
-Z1190A: MD8480C 1st RF Unit 3

**Additional Units (Option)**

-MD8480C-04: Additional RF Unit 3
-MU848060C: TDMA2 (for GSM/GPRS/EGPRS)
-MU848060C-01: EGPRS (R99)
-MU848055C: ISDN/CSD
-MU848077C: Baseband Interface Unit

**Additional BTS Units (Option)**

-MU848072E: BTS Evolution (for BTS #2-4)
-MU848072C-01: HSDPA (for BTS #1-4)
-MU848072C-02: HSUPA (for BTS #1-4)

**Standard Unit**

**Add. Unit (Option)**

**Add. BTS Unit (Option)**

**Software Options**

-MX848001A-01: Tx Diversity
-MX848001C-11: HSDPA Tx Diversity
-MX848001A-02: Compressed Mode
-MX848001A-03: Router Connection
-MX848001A-04: GSM CSD
-MX848001A-05: GSM Frequency Hopping
-MX848001A-06: W-CDMA CSD
-MX848001A-07: Message Encoder/Decoder
-MX848001C-30: DTM
-MX848001C-12: HSPA Evolution
-MX848001E-13: Higher Order Modulation
-MX848001E-14: 2x2 MIMO
-MX848001E-15: HSPA Evolution for uplink
-MX848001E-16: DC-HSDPA
-MX848001E-17: 64QAM and MIMO for HSDPA
-MX848001E-18: DB-DC- HSDPA
-MX848001E-20: DC- HSUPA
-MX848001E-21: MC- HSDPA
-MX848041E: Ciphering
-MX848041E-10: HSDPA Ciphering
-MX848045C: GSM/GPRS Ciphering

New!

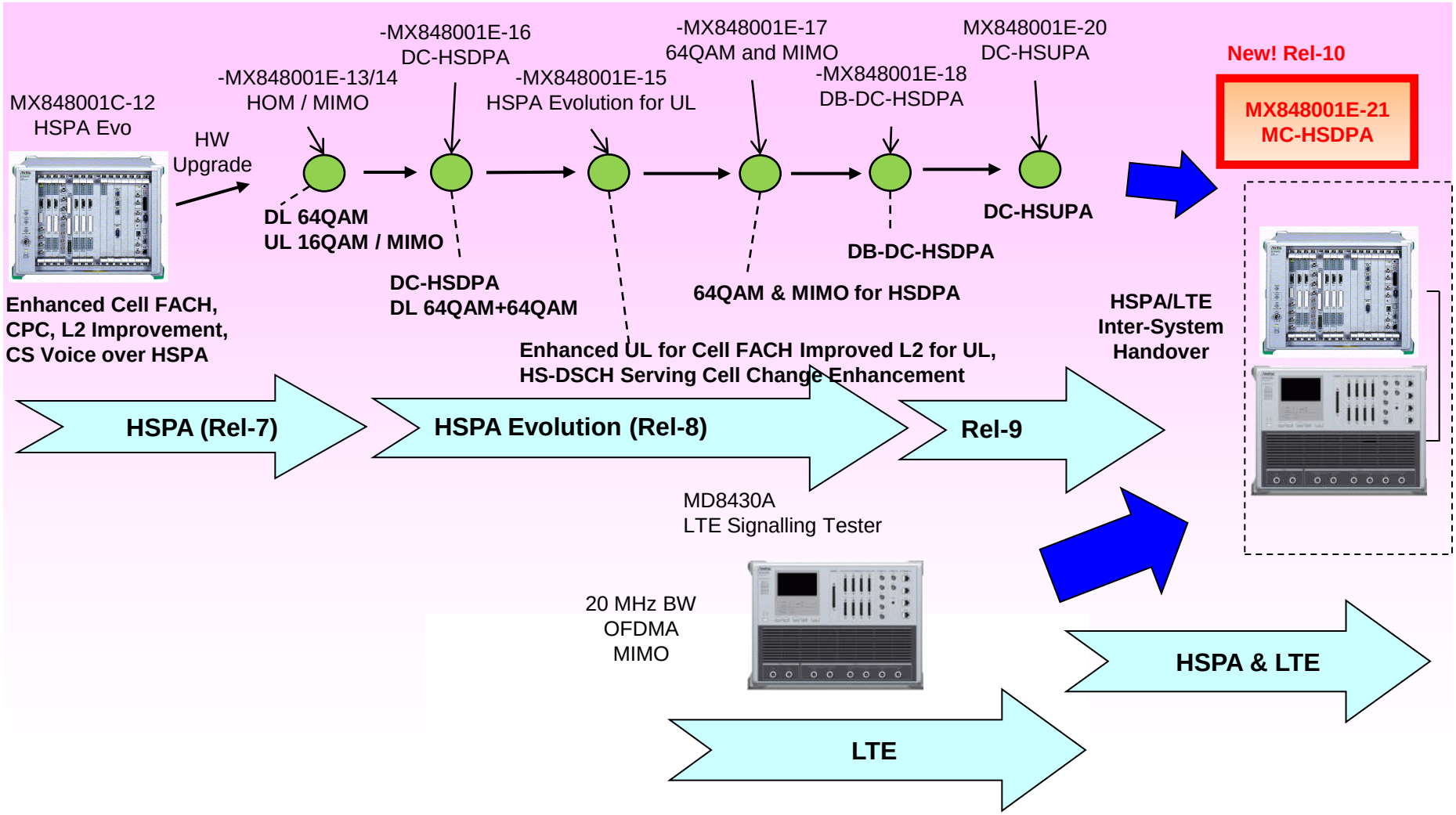
# PC Controller

- The MD8480C requires a PC controller with Microsoft Visual C++ or Visual Studio*1.
- Specifications
  - OS: Windows XP (SP2), Windows Vista, Windows 7*2
  - CPU: Pentium 4, ≥1.6 GHz (Core2Duo supported)*3
  - Memory: >512 MB
  - Interface: RS-232C x1, Ethernet (10BASE-T/100BASE-TX)
  - CD-ROM drive
  - Compiler: Microsoft Visual Studio 2005 or Visual Studio 2008, 2010, 2012, 2013 Express Edition

*1: Standard edition. Microsoft Visual Studio are registered trademarks of Microsoft Corporation in the USA and other countries.
*2: Microsoft Windows XP and Vista are registered trademarks of Microsoft Corporation in the USA and other countries.
*3: Pentium and Core2Duo are registered trademarks of Intel Corporation in the USA and other countries.

# MD8480C W-CDMA Signalling Tester

## Roadmap







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# Note

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Specifications are subject to change without notice.


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