

# <基于 CMW 的 HSPA 吞吐量测试>

## 应用指南

### 相关产品:

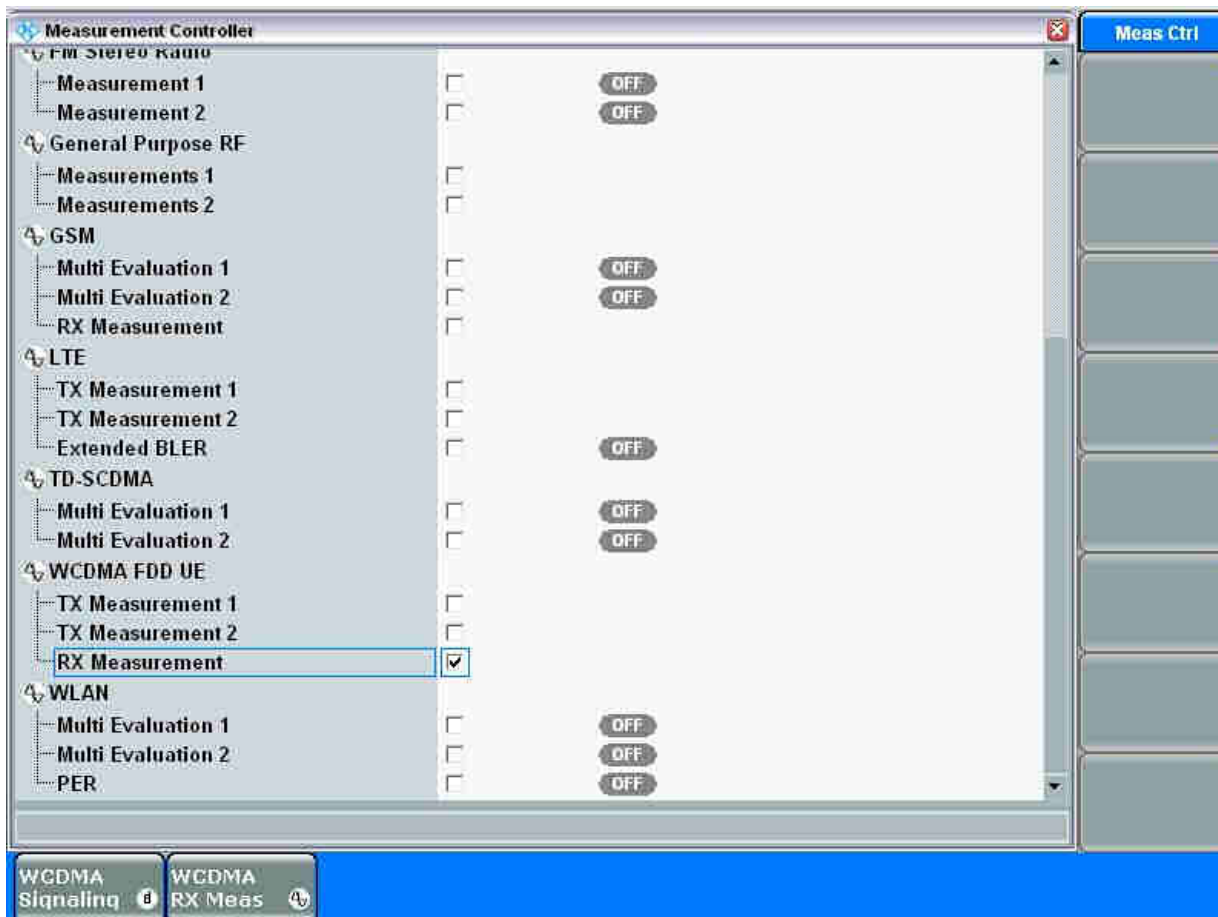
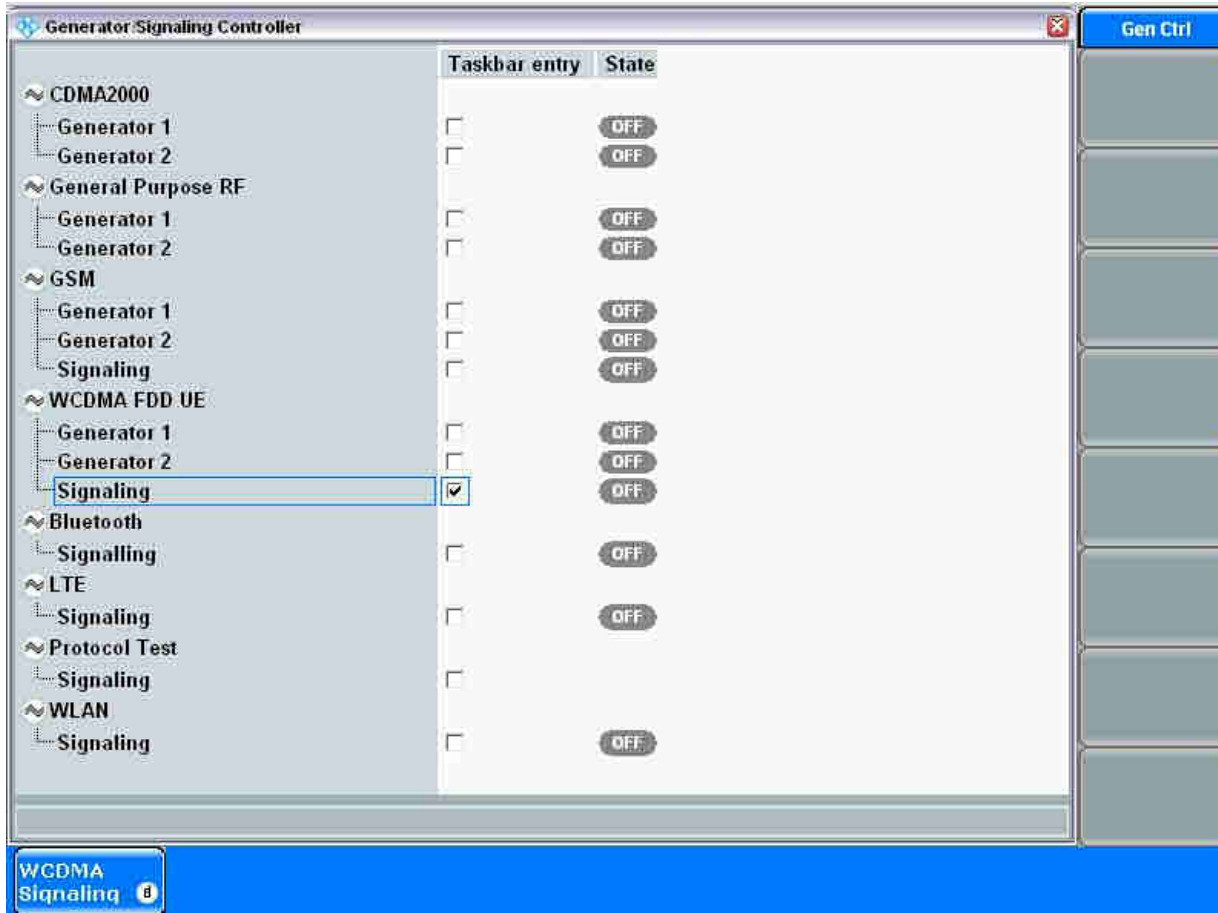
- | R&S®CMW500
- | R&S®CMW280

### 选件需求:

- | KS400, KS401, KS403, KS411, KS404

本应用指南基于 CMW WCDMA 3.0.30 版本

一、 打开所需的功能模块 WCDMA Signaling 和 WCDMA RX Measurement



二、 建立 HSPA 连接：设置 Type 为 HSPA 或 RMC+HSPA，设置 HSPA Direction 为 HSPA

The screenshot shows the WCDMA UE Signaling V3.0.30 interface. The 'Cell Setup' section is configured as follows:

- Band: Band 1
- Channel: 10563 Ch (Downlink), 9613 Ch (Uplink)
- Frequency: 2112.6 MHz (Downlink), 1922.6 MHz (Uplink)
- Output Power: -56.10 dBm
- Total Output: -56.10 dBm
- Scrambling Code: 0 hex (Downlink), 0 hex (Uplink)
- P-CPICH: -3.3 dB, Code: 0
- PS Domain:  Reduced Signaling
- Connection Setup: UE term. Connect: Test Mode
- Type: RMC + HSPA (dropdown menu is open showing RMC, HSPA, and RMC + HSPA)
- RMC: Data Rate DL: 12.2 kbps
- Test Mode: Loop Mode 2
- HSPA: Procedure: RMC on CS + HSPA 34.108
- Direction: HSDPA
- Data Pattern: PRBS9
- Error Insertion:  10 %

The 'UE Measurement Report' is turned On. The 'WCDMA-UE Signaling' button is OFF.

The screenshot shows the WCDMA UE Signaling V3.0.30 interface with the following configuration:

- Band: Band 1
- Channel: 10563 Ch (Downlink), 9613 Ch (Uplink)
- Frequency: 2112.6 MHz (Downlink), 1922.6 MHz (Uplink)
- Output Power: -56.10 dBm
- Total Output: -56.10 dBm
- Scrambling Code: 0 hex (Downlink), 0 hex (Uplink)
- P-CPICH: -3.3 dB, Code: 0
- PS Domain:  Reduced Signaling
- Connection Setup: UE term. Connect: Test Mode
- Type: RMC + HSPA
- RMC: Data Rate DL: 12.2 kbps, UL: 12.2 kbps
- Test Mode: Loop Mode 1 RLC
- HSPA: Procedure: RMC on CS + HSPA 34.108
- Direction: HSPA
- Data Pattern: PRBS9
- Error Insertion:  10 %

The 'WCDMA-UE Signaling' button is OFF.

三、 建立 HSPA 连接：启动信令模块，手机开机，注册，点击 Connect Test Mode 进行连接

The screenshot shows the 'WCDMA UE Signaling - V3.0.30' interface. The 'Connection Status' section indicates the device is 'Registered' and 'Attached'. The 'Event Log' shows a sequence of events from 04:03:24 to 04:05:30, including 'Cell On', 'RRC Connection Request', 'RRC Connection Established', and 'UE Registered and Attached'. The 'UE Measurement Report' is set to 'On'. The 'Cell Setup' section shows 'Band 1' with 'Downlink' at 10563 Ch and 'Uplink' at 9613 Ch. The 'Connection Setup' section shows 'UE term. Connect' set to 'Test Mode' and 'Type' set to 'RMC + HSPA'. The 'Data Rate' is set to 'DL 12.2 kbps' and 'UL 12.2 kbps'. The 'Test Mode' is set to 'Loop Mode 1 RLC'. The 'Procedure' is 'RMC on CS + HSPA 34.108'. The 'Direction' is 'HSDPA' and the 'Data Pattern' is 'PRBS9'. The 'Error Insertion' is set to '10 %'. The 'Routing' section shows 'WCDMA-UE Signaling' is 'ON'. The bottom buttons include 'Unregister', 'Connect Test Mode', 'Send SMS', and 'Config ...'.

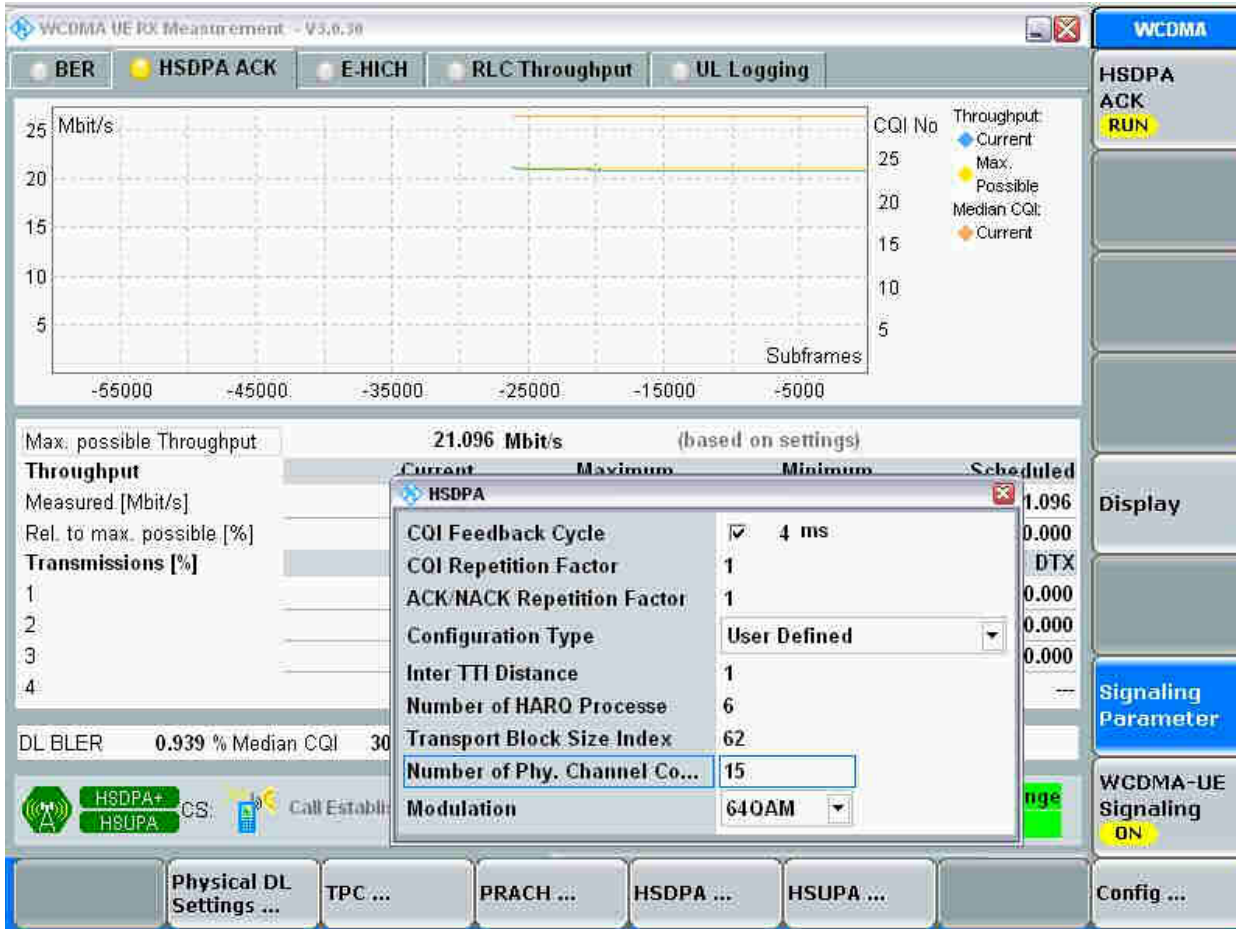
连接后在左下方的 UE Capability 界面中可以查看手机支持的频段和能力

The screenshot shows the 'WCDMA UE Signaling - V3.0.30' interface with the 'UE Capabilities' section selected. The 'Connection Status' section indicates the device is 'Call Established' and 'Connection Established'. The 'Event Log' shows a sequence of events from 04:05:55 to 04:06:05, including 'Establish RMC+HSPA Test Mode Call', 'RRC Connection Request', 'RRC Connection Established', 'CS Radiobearer Established', and 'CS and PS Radiobearer Established'. The 'UE Capabilities' section shows 'Band' supported from 1 to 9, 'Band' supported from 10 to 21, and 'Phys. Layer Cat.' supported from Rel. 5 to Rel. 8. The 'Cell Setup' section shows 'Band 1' with 'Downlink' at 10563 Ch and 'Uplink' at 9613 Ch. The 'Connection Setup' section shows 'UE term. Connect' set to 'Test Mode' and 'Type' set to 'RMC + HSPA'. The 'Data Rate' is set to 'DL 12.2 kbps' and 'UL 12.2 kbps'. The 'Test Mode' is set to 'Loop Mode 1 RLC'. The 'Procedure' is 'RMC on CS + HSPA 34.108'. The 'Direction' is 'HSDPA' and the 'Data Pattern' is 'PRBS9'. The 'Error Insertion' is set to '10 %'. The 'Routing' section shows 'WCDMA-UE Signaling' is 'ON'. The bottom buttons include 'Disconnect RMC', 'Send SMS', 'Handover ...', and 'Config ...'.

四、 HSDPA 下行吞吐率测试：进入 WCDMA RX Meas 模块，选择 HSDPA ACK 面板进行下行吞吐量测试

改变下行的吞吐率：需要选择 Signaling Parameter – HSDPA 设置 HSDPA 下行信道参数，影响吞吐率的参数有

- Inter TTI Distance: TTI 长度，越短吞吐量越大
  - Number of HARQ Process: 同时运行的 HARQ 的进程数
  - Transport Block Size Index: 传输快的大小，越大吞吐量越大
  - Number of Phy. Channel: 同时传输的物理信道数，越大吞吐量越大
  - Modulation: 有 QPSK, 16QAM, 64QAM 三种选择，64QAM 能达到最大的吞吐率
- 下图是最高速率为 21Mbps 的参数设置



五、下行最大吞吐率：如果需要测试下行最大吞吐率，还需要设置下行信道功率来使得下行信噪比达到最高，可以通过设置 Signaling Parameter – DL Channel Setting 来设置，将 HS-PDSCH 的功率设置为-1dB，Output Power(Ior)尽量设置的高一些

The screenshot shows the WCDMA UE RX Measurement software interface. A dialog box titled "Physical DL Settings" is open, displaying various power and channel parameters. The main window shows a throughput graph and a table of channel settings.

**Physical DL Settings Dialog:**

- Output Power (Ior): -56.10 dBm
- AWGN Noise (Ioc): -70.00 dBm
- Accumulated Power: 0.65 dB (Adjust to 0dB)
- OCNS: Auto
- Code Conflict: No Code Conflict Detected!
- Channel Table:
 

Channel	Level	Code
DPCH	<input checked="" type="checkbox"/> -18.0 dB	3
HS-SCCH #1	<input checked="" type="checkbox"/> -18.0 dB	2
HS-SCCH #2	<input checked="" type="checkbox"/> -18.0 dB	7
HS-SCCH #3	<input type="checkbox"/> -10.3 dB	8
HS-SCCH #4	<input type="checkbox"/> -10.3 dB	9
HS-PDSCH	<input checked="" type="checkbox"/> -1.0 dB	1
E-AGCH	<input checked="" type="checkbox"/> -9.3 dB	3
E-HICH	<input checked="" type="checkbox"/> -12.3 dB	6
E-RGCH	<input type="checkbox"/> -12.3 dB	6

**Main Window Graph:**

The graph shows Throughput (Mbit/s) on the y-axis (0 to 25) versus Subframes on the x-axis (-15000 to -5000). The legend indicates:
 

- Throughput: Current (blue diamond)
- Max. Possible (yellow circle)
- Median CQI: Current (orange diamond)

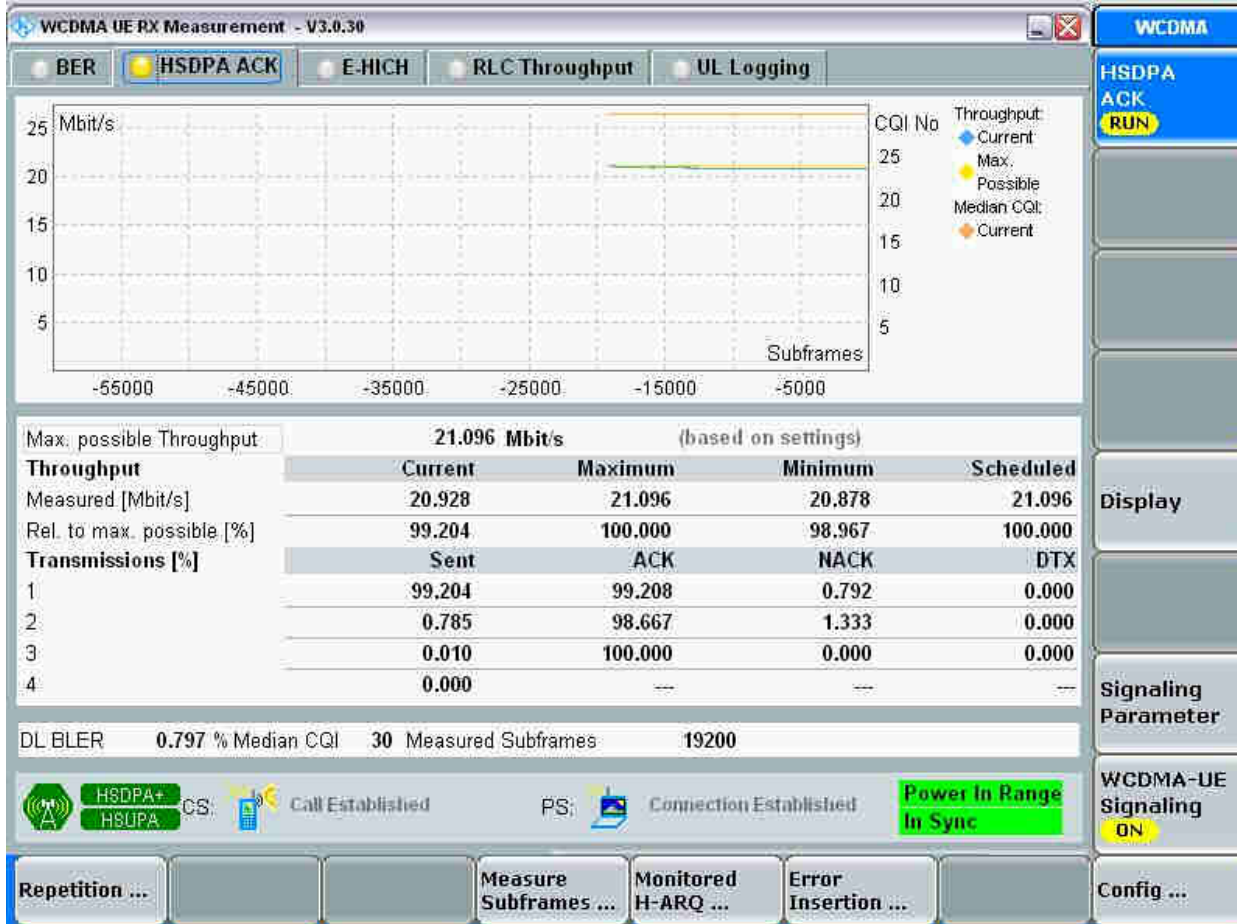
**Channel Settings Table (based on settings):**

Maximum	Minimum	Scheduled
---	---	---
---	---	---
ACK	NACK	DTX
---	---	---
---	---	---
---	---	---

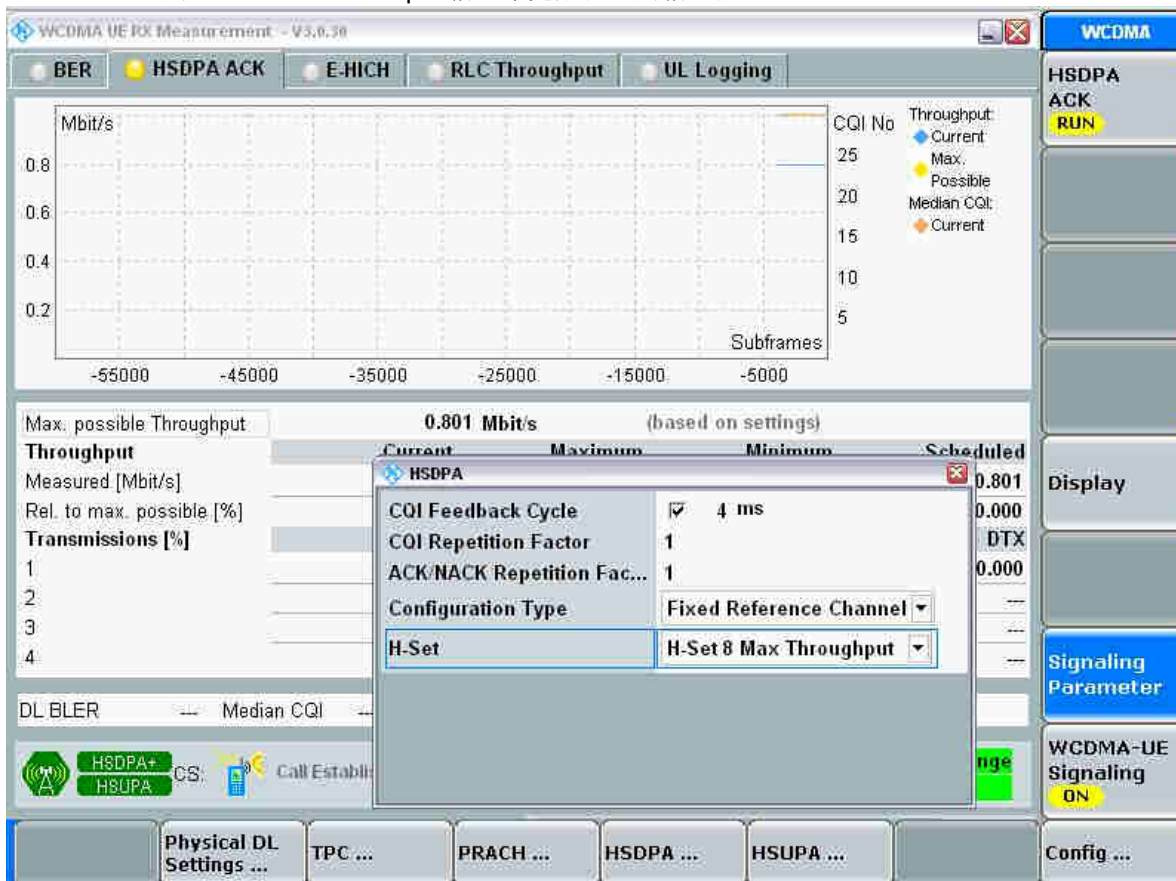
**Status and Controls:**

- WCDMA ACK: OFF
- Signaling Parameter: (button)
- WCDMA-UE Signaling: ON
- Connection Established: Power In Range In Sync
- Physical DL Settings ... (button)
- TPC ... (button)
- PRACH ... (button)
- HSDPA ... (button)
- HSUPA ... (button)
- Config ... (button)

六、 下行最大吞吐率测试，设置完以上参数后，启动 HSDPA-ACK 测试即可测得最大吞吐率



七、 对于没有配置 KS411 User Define Channel 功能的客户，还可以通过选择 Fixed Reference Channel 的 HSet-8 max throughput 信道来完成以上的信道配置



八、 上行吞吐率测试：选择同一界面下的 E-HICH 面板进行 HSUPA 上行吞吐率测试，可以通过 Signaling Prameter-HSUPA 来设置 HSUPA 参数，影响吞吐率的参数有：

- TTI Mode: 有 2ms 和 10ms 两种 TTI，其中 2ms TTI 速率更高
- Maximum Channelization Code: 选择 HSUPA 的码道组合，对于支持上行 5.76Mbps 的终端，选择 2\*SF2+2\*SF4 可以获得最高的上行速率

The screenshot shows the WCDMA UE RX Measurement software interface. The main window displays E-HICH reception statistics for 14900 measured frames. A dialog box for HSUPA configuration is open, showing settings for TTI Mode (2 ms), RLC PDU Size (336), E-TFCI Table Index (0), H-ARQ Redundancy Versions (Always RV 0), Minimum Set E-TFCI (checked, 9), Happy Bit Delay Condition (100 ms), Puncturing Limit PLnon-max (0.84), Maximum Channelisation Code (2xSF2), and Initial Serving Grant (13 Type: Primary).

E-HICH Reception		CRC		Throughput	
False	0	Correct	14900	Current	2886000 bit/s
Correct	14900	Error	0	Max. Possible	2886000 bit/s
All Valid	14900	BLER [%]	0.000	Expected Max.	2886000 bit/s
False Ratio [%]	0.000				

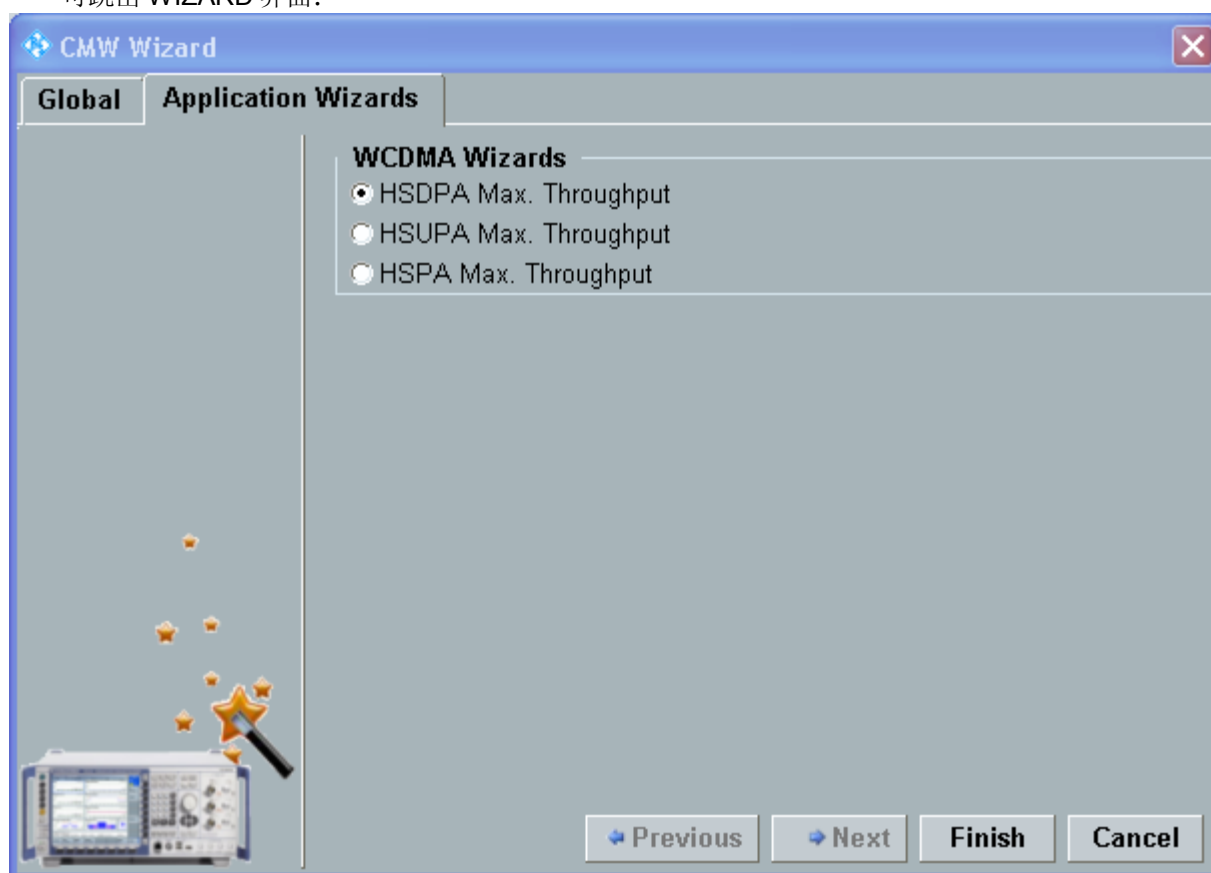
九、 上行吞吐率测试界面：

The screenshot shows the WCDMA UE RX Measurement software interface with the E-HICH panel selected. The main window displays E-HICH reception statistics for 7800 measured frames. The status bar at the bottom indicates 'Call Established', 'PS: Connection Established', and 'Power In Range In Sync'.

E-HICH Reception		CRC		Throughput	
False	0	Correct	7800	Current	2886000 bit/s
Correct	7800	Error	0	Max. Possible	2886000 bit/s
All Valid	7800	BLER [%]	0.000	Expected Max.	2886000 bit/s
False Ratio [%]	0.000				



十、运用 Wizard 来进行最大吞吐率测试：CMW 提供了非常方便的 Wizard 功能，能够一键式测试 HSPA 下行和上行最大吞吐率。只需要在建立 HSPA 连接之后，按下 CMW 面板上的 WIZARD 按钮，可跳出 WIZARD 界面：



可以选择下行最大吞吐率，上行最大吞吐率或上下行最大吞吐率来一键式完成前面章节所描述的设置。

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