Qualcomm
TECHNOLOGIES, INC

QCAT TD-SCDMA Analysis

User Guide

80-NF073-2 A

June 19, 2014

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Revision history

Revision	Date	Description
A	Jun 2014	Initial release

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1 Introduction

1.1 Purpose

This document describes all analyzers that are available in the TD-SCDMA section of [Q2]. It describes how fields are calculated and what data is used for plotting.

1.2 Scope

This document is intended for engineers doing final verification or testing of TD-SCDMA systems. Engineers are expected to understand TD-SCDMA log packets and the values contained in them. This document does not explain the usefulness of specific statistics or analyzers, but rather their exact functions.

1.3 Conventions

Function declarations, function names, type declarations, and code samples appear in a different font, e.g., `#include`.

1.4 References

Reference documents are listed in Table 1-1. Reference documents that are no longer applicable are deleted from this table; therefore, reference numbers may not be sequential.

Table 1-1 Reference documents and standards

Ref.	Document	
Qualcomm Technologies		
Q1	*Application Note: Software Glossary for Customers*	CL93-V3077-1
Q2	*QCAT6 User Guide*	80-V1233-6
Q3	*WCDMA Analysis Guide*	80-V5400-3

1.5 Technical assistance

For assistance or clarification on information in this document, submit a case to Qualcomm Technologies, Inc. (QTI) at https://support.cdmatech.com/.

If you do not have access to the CDMATech Support Service website, register for access or send email to support.cdmatech@qti.qualcomm.com.

1.6 Acronyms

For definitions of terms and abbreviations, see [Q1].

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2 Histograms

2.1 TDS CQI RTBS histogram

The TDS CQI RTBS histogram, illustrated in Figure 2-1, shows the RTBS value from the TD-SCDMA firmware CQI (0xD121).

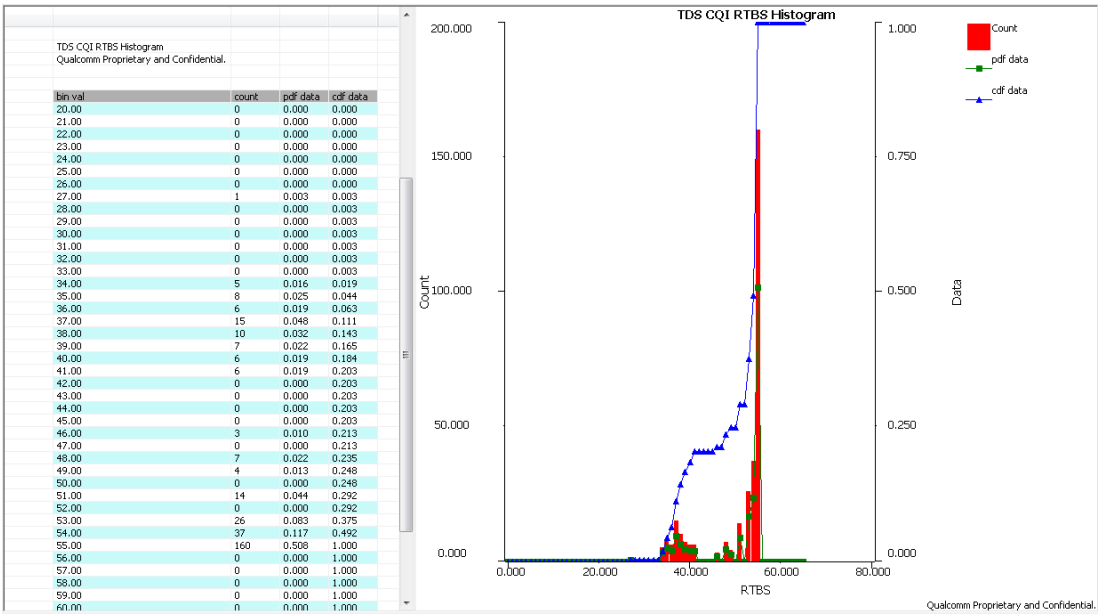

Figure 2-1 TDS CQI RTBS histogram

2.2 TDS HSSCCH DL SS histogram

The TDS HSSCCH DL SS histogram, illustrated in Figure 2-2, shows the DL SS value from the TD-SCDMA firmware HSSCCH decoding results (0xD124).

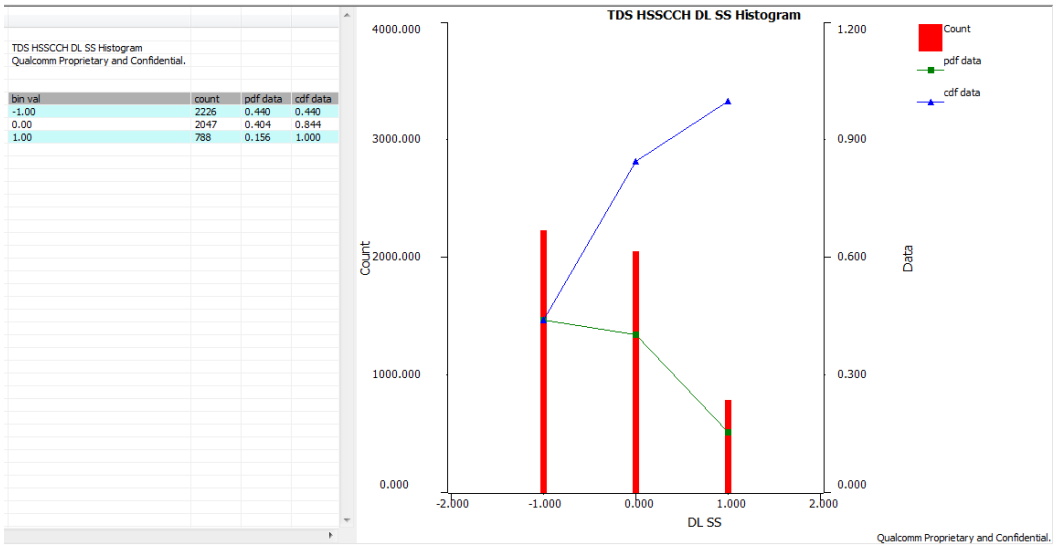

Figure 2-2 TDS HSSCCH DL SS histogram

2.3 TDS HSSCCH DL TPC histogram

The TDS HSSCCH DL TPC histogram, illustrated in Figure 2-3, shows the DL TPC value from the TD-SCDMA firmware HSSCCH decoding results (0xD124).

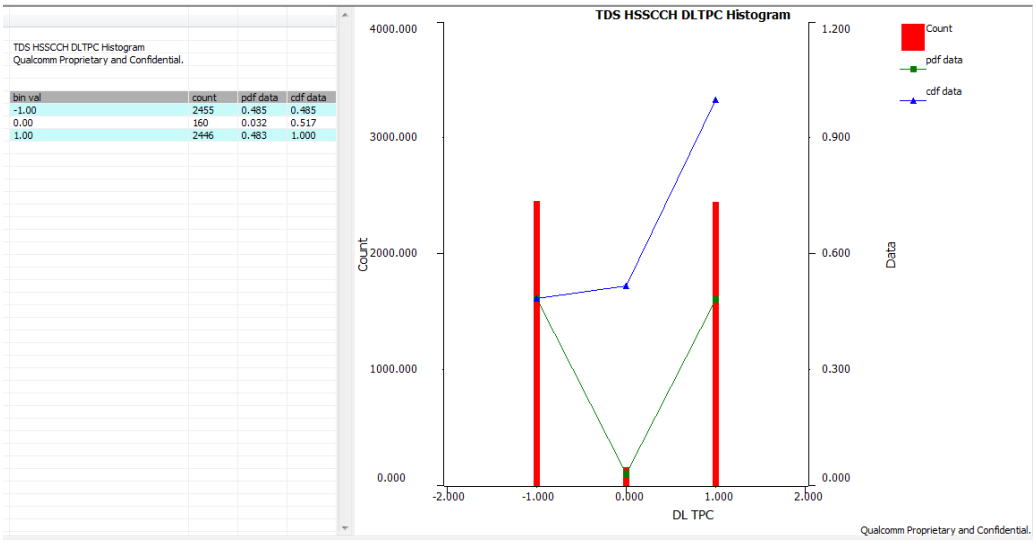

Figure 2-3 TDS HSSCCH DLTPC histogram

2.4 TDS HSSCCH TBS histogram

The TDS HSSCCH TBS histogram, illustrated in Figure 2-4, shows the TBS value from the TD-SCDMA firmware HSSCCH decoding results (0xD124).

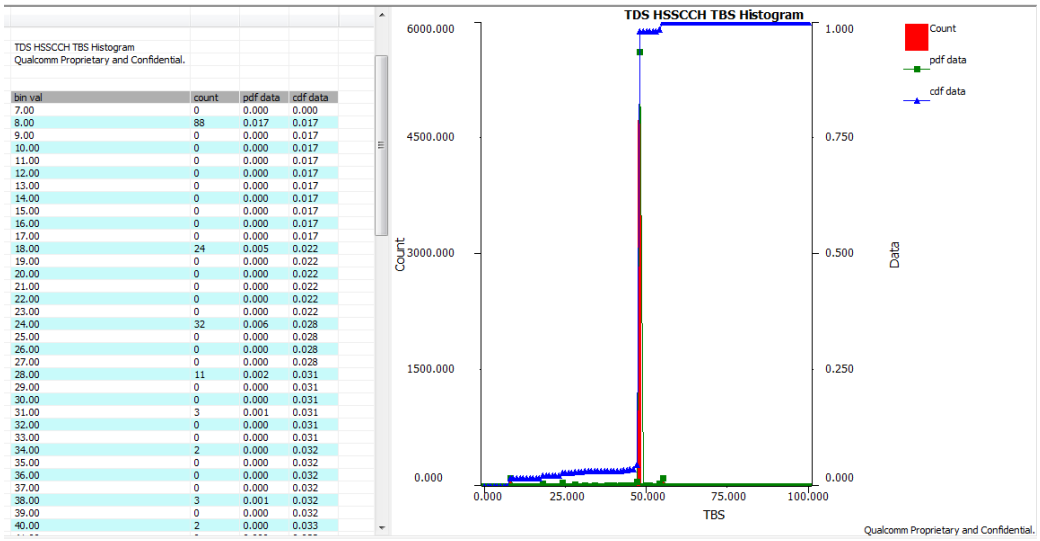

Figure 2-4 TDS HSSCCH TBS histogram

2.5 TDS HSSCCH TS histogram

The TDS HSSCCH TS histogram, illustrated in Figure 2-5, shows the TS value from the TD-SCDMA firmware HSSCCH decoding results (0xD124).

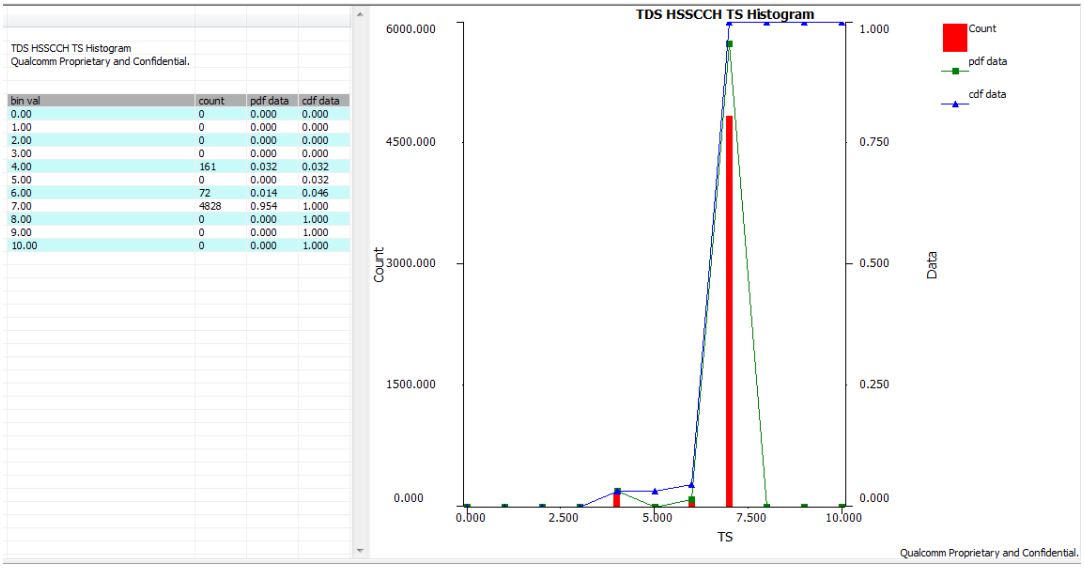

Figure 2-5 TDS HSSCCH TS histogram

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3 Text Outputs

3.1 TDS average OOS Duration

The analyzer looks for either EVENT_GSM_RR_OUT_OF_SERVICE or TDSCDMA_RRC_OUT_OF_SERVICE and saves the timestamps. Following these OoS messages either in GSM or TDS, check TDSCDMA_RRC_CELL_SELECTED or EVENT_GSM_RR_IN_SERVICE and save the timestamp. The time difference between the two events is the time duration in which the UE was OoS.

To calculate the average duration of OoS in a log, divide the time duration in OoS by the total duration of the log.

TDS Avg. OOS Duration

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OOS Summary				
Start Time	**End Time**	**Start State**	**End State**	**OOS Duration (ms)**
23:15:43.465	23:16:19.316	TDSCDMA_RRC_OUT_OF_SERVICE	TDSCDMA_RRC_CELL_SELECTED	35851

Average OOS Duration Summary	
Log Start Time	23:15:01.210
Log End Time	23:16:25.690
Log Duration (ms)	84480
Total OOS duration in the log (ms)	35851
Avg OOS Duration (ms)	35851.00
Percentage of OOS Duration Relative to the log	42.44

Figure 3-1 TDS Avg. OOS Duration

3.2 TDS HSDPA summary

3.2.1 HSDPA Tput

HSDPA Tput is the bitrate_avg_kbps value from the last 0xD033 log packet of the log.

3.2.2 CQI summary

The average RTBS is calculated based on the average value of RTBS from the 0xD121 log packet:

- % of 16QAM = % of total count of 16QAM/total count of (16QAM + QPSK)
- % of QPSK = % of total count of QPSK/total count of (16QAM + QPSK)
- Number of times seEff = 0/Total Sample, (%) and number of times RTBS = 0/Total Sample, (%) are calculated from the 0xD121 log packet. Total Sample = Total number of 0xD121 packet in the log.
- Average requested code rate = Average of code rate in 0xD121 packet

3.2.3 Average target SIR

Average target SIR is calculated from 0xD124 packet's target SIR.

3.2.4 Average HS-SCCH SIR

Average HS-SCCH SIR is calculated from 0xD124 packet's SIR value. Use db-to-linear conversion for averaging, since SIR is in db.

3.2.5 Avg SIR

Avg SIR is the average of SIR per subframe value printed in the 0xD11F log packet.

3.2.6 Avg RSCP

Avg RSCP is the average of filtered RSCP from the 0xD00A log packet only for ASET.

3.2.7 Avg Tx power

Avg Tx power is the calculated average Tx power based on time slots existing from the 0xD11B log packet:

- Avg Tx power for TS1 – Average of txOutputPower for TS1
- Avg Tx power for TS2 – Average of txOutputPower for TS2

3.2.8 Percentage of scheduling

The percentage of scheduling is calculated from the total number of num_scch_valid/Total number of num_sub_frames from packet 0xD032.

3.2.9 Percentage of allocated modulation scheme

The percentage of allocated modulation scheme is calculated based on the 0xD031 log packet and using the values for mod_scheme = 0 as QPSK and mod_scheme=1 as 16QAM for SCCH only. The percentage was calculated as the amount of time mod_scheme=0,1:

- % Mod 0 = 4.54% (QPSK mod)
- % Mod 1 = 95.45% (16QAM mod)

3.2.10 Average TBS index

Average TBS index is checked from the 0xD124 log packet and checked for TBS values only for SCCH and gives average values for TBS over the entire log duration.

3.2.11 HSUPA Tput HS-SCCH BLER (ZTE)/HCSN out of sequence

Check for the first 0xD124 packet in the log and for the value corresponding to HCSN. The value for HSCN ranges from 0 to 7 and the value resets to 0 once the value reaches 7.

The sequence of HCSN is cyclic with a pattern of {0,1,2,3,4,5,6,7,0,1,2,3,4,5,6,7,0,…..}. 0xD124 is printed for every 5 ms and it has the field HSCN. the analyzer should check if the values are cyclic and values are not out of sequence. Initialize out of sequence counter C=0 at the beginning of the log. Mod 8 counting should be implemented, e.g., if HCSN = 7 and the next instance is HCSN = 1 in log packet 0xD124, count it as (1 – 7) - 1 + 8 = 1. In this example, the counter increased by 1. Keep checking 0xD124 until end of the log.

The analyzer captures the counter value and prints it in the HSDPA summary.

If HCSN resets to 0 in between the sequence of {0,1,2,3,4,5,6,7}, check for any of the following RRC messages when HCSN = 0:

- message radioBearerReconfigurationComplete
- message physicalChannelReconfigurationComplete
- transportChannelReconfigurationComplete

If any of these cases are found, do not increment the counter C; the ZTE network resets HSCN to zero following any reconfiguration.

In addition, HSCN skips in the following cases:

- 0x1FFB event – TDSCDMA_RRC_RL_FAILURE
- 0x1FFB event – TDSCDMA_RRC_MAX_RESET
- RRC connection release message

If there is RL failure, MAX RESET HSCN, or RRC connection release, then HCSN going out of sequence is expected. If RL failure or MAX RESET was found, check for one of the following RRC messages after RL failure or MAX RESET:

- message physicalChannelReconfigurationComplete
- message radioBearerReconfigurationComplete

Following PCRC, RB setup complete, or RBRC, HSCN will be reset to 0 and values should be in sequence from the first 0xD124 packet following the PCRC or RB Setup Complete message.

If there was an RRC Connection Release message, stop checking for the HSCN sequence in 0xD1024 and check for the following first RB Setup Complete message to resume checking HCSN sequence, or check for the RB Setup Complete message until the end of the log:

- message radioBearerSetupComplete

3.2.12 HSUPA Tput HS-SCCH BLER (TD-TECH)/HCSN out of sequence

If HCSN is reset to 0 in between the sequence of {0,1,2,3,4,5,6,7}, check for any one of the following RRC messages found just before the 0xD124 packet with HCSN = 0:

- message radioBearerReconfigurationComplete
- message physicalChannelReconfigurationComplete
- message transportChannelReconfigurationComplete

For 1, 2, and 3 above, check for the 0xD108 packet before message physicalChannelReconfiguration, message radioBearerReconfiguration, or message transportChannelReconfiguration. Check for the value in midIndex. If the midIndex value is different before PCR and after PCRC and HSCN is getting reset to 0, then do not consider this as a skip in sequence to increment counter C; if not, increment counter C.

The network resets HSCN to zero following any reconfiguration which results in a handover.

3.2.13 Percentage of ts_hs_pdsch

The percentage of ts_hs_pdsch is calculated by checking the value of the 0xD031 log packet for ts_hs_pdsch. The percentage is calculated by taking the value of ts_hs_pdsch (total number of times it occurred) compared to the total number of the ts_hs_pdsch variable found in the log.

3.2.14 RxAGC C0/C1

The RxAGC C0/C1 is the average RxAGC per the timeslot table. It fills up accordingly from the 0xD100 log packet and checks for the slot information, e.g., find TS=0, average rxPowerdBm for index 0 and index 1, populated from the table for RxAGC C0/RxAGC C1, respectively.

3.2.15 UE category

The UE category is checked from 0xD121 log packet, e.g., UEcategory = X, and the percentage is computed for the number of times Category = X over the complete duration of the log.

3.2.16 RxD on time percentage in DCH

Case 1

1. Checks for event TDSCDMA_RRC_STATE = New state: CELL_DCH.
2. Checks for EVENT_TDSCDMA_RXD_STATE, with either RxD state = TDSL1 Event L1 RxD Off or TDSL1 Event L1 RxD On.
3. Continues to check for step 2 until event – TDSCDMA_RRC_STATE: New state: Disconnected.
4. Calculates RxD ON percentage.
5. Continues to check if there is TDSCDMA_RRC_STATE = New state: CELL_DCH.
6. If RRC state was not in DCH, stores the percentage of RxD On as P1.

Case 2

1. Checks for event TDSCDMA_RRC_STATE = New state: CELL_DCH.
2. Checks for EVENT_TDSCDMA_RXD_STATE, with either RxD State = TDSL1 Event L1 RxD Off or TDSL1 Event L1 RxD On.
3. Continues to check for step 2 until event TDSCDMA_RRC_STATE: New state: Disconnected.
4. If RRC disconnect is not available, takes the end of log duration to calculate either RxD On or Off depending on the last event printed in the log.

Case 3

1. Checks for TDSCDMA_RRC_STATE = New state: CELL_DCH.
2. Checks for EVENT_TDSCDMA_RXD_STATE, with either RXD State = TDSL1 Event L1 RXD Off or TDSL1 Event L1 RXD On.
3. Continues to check until event TDSCDMA_RRC_STATE: New state: Disconnected.
4. Continues to check if there is TDSCDMA_RRC_STATE= New state: CELL_DCH.
5. If step 4 is found, continues from step 2 to step 3.
6. If RRC disconnect is not available, takes the end of log duration to calculate either RxD On or Off depending on the last event printed in the log.
   - RxD Off time = Sum of consecutive (TDSL1_EVENT_L1_RXD_OFF – TDSL1_EVENT_L1_RXD_ON)
   - RxD On % in DCH = RxD ON time/(RxD On time + RxD Off time)

3.2.17 HARQ configured, HS-SCCH and HS-SICH vs Time

numHarqProcess, scchTimeSlot, sichTimeSlot, and ueCategory are collected from the 0xD030 packet and displayed along the packet's timestamp.

TDS HSDPA Summary

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HSPDA Summary		
Layer 1		
HSDPA Tput		
	Bit Rate Average (Kbps)	0
CQI Summary		
	Average RTBS	0.00
	% of 16QAM	N/A
	% of QPSK	N/A
	No. of times seEff = 0 / Total Sample, (%)	0 / 0, (N/A)
	No. of times RTBS = 0 / Total Sample, (%)	0 / 0, (N/A)
	Average Requested code rate	0.00
Average Target SIR	0.00	
Average HS-SCCH SIR	0.00	
Average SIR	0.00	
Average RSCP	0.00	
Average Tx Power		
	Slot	Tx Power
Percentage of Scheduling: (HS-SCCH Successes / Attempts, (Success Rate in %))	0 / 0, (N/A)	
Percentage of allocated modulation scheme		
	QPSK	N/A
	16 QAM	N/A
Average TBS index	0	
HS-SCCH BLER (ZTE)/ HCSN out of sequence	0	
HS-SCCH BLER (TD-TECH)/ HCSN out of sequence	0	
Percentage of Ts Hs Pdsch		
	Ts Hs Pdsch	Percentage
RxAGC Co/C1		
Time Slot	RxAGC (dbm)	
UE category		
	UE category	Percentage
RxD on time percentage in DCH	0.00	

HARQ configured, HS-SCCH And HS-SICH Vs Time

Time	SCCH time slot	SICH TimeSlot	numHarqProcess	UE Category
23:43:13.531	3	1	5	15
23:43:55.291	3	1	5	15
23:44:01.931	3	1	5	15
23:44:35.380	3	1	0	0

Figure 3-2 TDS HSDPA Summary

3.3 TDS summary

TDS summary is important as this provides the overall TDSCDMA summary in one sheet. It includes the key metrics of RRC, RLC, and NAS.

TDS Summary

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RLC Summary			
	Number of RLC RESET PDUs		0
	Number of RLC RESET Signalling PDUs		0
RRC Summary			
	Number of OOS		0
	Number of RB setup		1
	RB setup success rate		100.00
	Number of RB reconfig		0
	RB reconfig success rate		N/A
	Number of Transport Channel reconfig		0
	Transport Channel success rate		N/A
	Number of Cell update		0
	Cell update success rate		N/A
	Number of RRC connection request		4
	Number of RRC connection success		1
	Number of Cell Reselection Success		0
	Average BCH reading duration (ms)		0.00
	Number of call drops		0
	RLC MAX RESET		0
	RL failure		0
	RRC connection release-Unspecified		0
	Average Acquisition Time (ms)		0.00
NAS Summary			
	Number of LAU		0
	Number of RAU		0
	Number of LAU success		0
	Number of RAU success		0
	Number of Service request	PS	0
		CS	0
	Number of PDP context activation		0
	Number of PDP context success		0

Figure 3-3 TDS Summary

3.3.1 RLC

The RLC consists of:

- RLC reset times data – Number of RLC RESET PDUs received and sent (Log packets: DL 0xD088/UL 0xD08B)
- RLC reset times signaling – Number of RLC RESET PDUs received and sent (Log packets: DL 0xD089/UL 0xD08C)

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3.3.2 RRC

The RRC consists of:

- OoS times – Number of occurrences of EVENT_TDSCDMA_RRC_OUT_OF_SERVICE
- RB setup times – Number of occurrences of Radiobearersetup (0xD0E3)
- RB setup success rate – Number of occurrences of Radiobearersetup/Radiobearersetup complete in % (0xD0E3)
- RB reconfig times – Number of occurrences of Radiobearer reconfiguration (0xD0E3)
- RB reconfig success rate – Number of occurrences of Radiobearer reconfiguration/Radiobearer reconfiguration complete in % (0xD0E3)
- TrCh reconfig times – Number of occurrences of Transport channel reconfiguration (0xD0E3)
- TrCh reconfig success rate – Number of occurrences of Transport channel reconfiguration/Transport channel reconfiguration complete in % (0xD0E3)
- Cell update times – Number of occurrences of Cell Update (0xD0E3)
- Cell update success rate – Number of occurrences of Cell Update/Cell Update Confirm in % (0xD0E3)
- RRC connection request times – Number of RRC connection requests (0xD0E3)
- RRC connection success times – Number of sequence of the following events (0xD0E3):
  - message rrcConnectionRequest
  - message rrcConnectionSetup
  - message rrcConnectionSetupComplete
- Cell reselection success times – Number of following event pairs:
  - EVENT_TDSCDMA_TO_TDSCDMA_RESELECTION_START
  - EVENT_TDSCDMA_TO_TDSCDMA_RESELECTION_END
- Average BCH reading duration:
  - Average of time difference between L1 State = BCH and L1 State = PCH

3.3.3 NAS

The NAS consists of:

- LAU times – Number of occurrences of LOCATION_UPDATING_REQUEST (0x713A)
- RAU times – Number of occurrences of GMM_ROUTING_AREA_UPDATE_REQUEST (0x713A)
- LAU success rate – Number of occurrences of LOCATION_UPDATING_ACCEPT (0x713A)
- RAU success rate – Number of occurrences of GMM_ROUTING_AREA_UPDATE_ACCEPT (0x713A)
- Service request times:
  - PS – Number of occurrences of GMM_SERVICE_REQUEST (0x713A)
  - CS – Number of occurrences of CM_SERVICE_REQUEST (0x713A)
- PDP context activation times – Number of occurrences of SM_ACTIVATE_PDP_CONTEXT_REQUEST (0x713A)
- PDP context success rate – Number of occurrences of SM_ACTIVATE_PDP_CONTEXT_ACCEPT (0x713A)

3.3.4 BLER

BLER is calculated based on the trch_id from the 0xD016 log packet.

- BLER for chantype DCH for each trch_id = Sum of crc_err/Sum of crc_rece from all D016 log packets
- High Error Period (BLER ≥ 20%) = The number of instances of BLER > 20% for each trch_id

3.3.5 Average OoS duration summary

The analyzer looks for either EVENT_GSM_RR_OUT_OF_SERVICE (437) or TDSCDMA_RRC_OUT_OF_SERVICE (2012) and saves the timestamps. Following these OoS messages, it finds either TDSCDMA_RRC_CELL_SELECTED (2008) or EVENT_GSM_RR_IN_SERVICE (436) and saves the timestamp. The time difference between the two events is the time duration in which the UE was OoS.

Average duration of OoS in a log = Time duration in OoS/total duration of the log.

3.3.6 Number of out of sync events in DCH state

The analyzer looks for TDSCDMA_RRC_STATE with payload New state: CELL_DCH. It checks the number of EVENT_TDSCDMA_DL_SYNC_STATUS that were found in the log with Payload = 0x00 before event TDSCDMA_RRC_STATE, New state: Disconnected.

Essentially, it checks for the number of EVENT_TDSCDMA_DL_SYNC_STATUS with payload 0 between CELL_DCH and DISCONNECTED payloads of TDSCDMA_RRC_STATE.

3.3.7 RACH summary

The summary reflects the following three KPIs:

- RACH failure rate = ((Number of RRCConnectionRequest - (minus) Number of RRCConnectionSetup with same IMSI/TMSI)/(divide) Number of RRCConnectionRequest) * 100
- RACH success rate = (Number of RRC connection setup with same IMSI/TMSI as RRCConnectionRequest/(divide) Number of RRCConnectionRequest) * 100
- Average accessing time – Time consumption between the first RRC connection request and the last RRC connection setup (with the same TMSI or IMSI in RRC CONNECT REQ)

3.3.8 Average data rate allocation by the network

- Checks for the first 0xD0E4 packet, notes the timestamp – T1
- Saves the timestamp of the second 0xD0E4 packet in the log as T2
- The value of dl_db_rate and ul_rb_rate that is printed in the first 0xD0E4 packet is valid for time duration X= (T2-T1 sec)

  This keeps repeating until the end of the log and calculates the weighted average for both dl_rb_rate and ul_rb_rate. Weighted average assignment rate is (data rate assigned * time allocated/total time).

3.3.9 Average data rate allocation by network per cell

- Checks for the first 0xD0E4 packet, notes the timestamp – T1
- Checks for the 0xD108 packet before the packet and notes the midIndex = 67, where midIndex = cell ID
- Continuously checks for the 0xD108 packet before finding the next 0xD0E4 packet; if the midIndex changes in the 0xD108 packet, e.g., to 68, saves the timestamp at T2, continues to check for the next occurrence of the 0xD0E4 packet, and saves the timestamp of 0XD0E4 as T3
  - 0xD018 – Checks for midIndex, e.g., 67
  - First 0xD0E4 – Timestamp T1 (1^{st} sec) dl_rb_rate = Z1, ul_rb_rate = Z2
  - 0xD018 – Checks for midIndex, e.g., 68 – T2 (10^{th} sec)
  - First 0xD0E4 – Timestamp T1 (20^{th} sec) dl_rb_rate =Z3, ul_rb_rate = Z4 T3 (20^{th} sec)
  - 0xD018 – Checks for midIndex, e.g., 67 – T4 (30^{th} sec)
  - First 0xD0E4 – Timestamp T1 (1^{st} sec) dl_rb_rate = Z6, ul_rb_rate = Z5 T5 (40^{th} sec)

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Cell 67 allocation

- Part1
  - UL allocation for cell 67 = ul_rb_rate = Z2
  - DL allocation for cell 67 = dl_rb_rate = Z1
  - Duration of allocation = T2−T1
- Part2
  - UL allocation for cell 67 = ul_rb_rate = Z4
  - DL allocation for cell 67 = dl_rb_rate = Z3
  - Duration of allocation = T5−T4

Cell 68 allocation

- Part1
  - UL allocation for cell 68 = ul_rb_rate = Z2
  - DL allocation for cell 68 = dl_rb_rate = Z1
  - Duration of allocation = T3−T2
- Part2
  - UL allocation for cell 68 = ul_rb_rate = Z4
  - DL allocation for cell 68 = dl_rb_rate = Z4
  - Duration of allocation = T4−T3
- Weighted average UL allocation per cell:

  Cell 67 = Z2(T2−T1)+Z4(T5−T4)/(T2−T1) + (T5−T4)

4 Grid/Plot Outputs

4.1 RLC analysis time grids

4.1.1 TDS RLC ack nack vs time

Data source

- 0xD088 – TD-SCDMA DL RLC AM PDU
- 0xD089 – TD-SCDMA DL RLC AM signaling PDU
- 0xD08B – TD-SCDMA UL RLC AM PDU
- 0xD08C – TD-SCDMA UL RLC AM signaling PDU

Description

Table 4-1 lists the information shown in the TDS RLC ack nack vs time grid.

Table 4-1 TDS RLC ack nack vs time

Name	Description
Time	Timestamps
Log Ch	Logical channel number
NACK	Sequence number of NACKed PDU
ASN	Accumulated sequence number

Note: TDS RLC AckNack_Ch27 vs time shows the same information, but Log Ch is limited to 27.

Figure 4-1 shows an example TDS RLC ack nack vs time grid.

TDS RLC Ack Nack vs. Time
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Time	Log Ch	NAK	ASN
00:25:02.151	27	3499	3499
00:25:22.231	27	276	3775
00:25:22.491	27	285	4060

Figure 4-1 TDS RLC ack nack vs time

4.1.2 TDS RLC (DL/UL) control vs time

Data source

- 0xD088 – TD-SCDMA DL RLC AM PDU
- 0xD089 – TD-SCDMA DL RLC AM signaling PDU
- 0xD08B – TD-SCDMA UL RLC AM PDU
- 0xD08C – TD-SCDMA UL RLC AM signaling PDU

Description

Table 4-2 lists the information in the TDS RLC (DL/UL) control vs time grid; the control vs time grid provides the information for DL and UL separately.

Table 4-2 TDS RLC (DL/UL) control vs time

Name	Description
Time	Timestamps
Log Ch	Logical channel number
WIN	Window size
MRW_SN	Displays first SN in the MRW list when SUFI of type MRW is logged
MRW_ACK	Displays first SN in the MRW list when SUFI of type MRW_ACK is logged
RST	Displays 1 if control PDU is a RESET PDU
RST_ACK	Displays 1 if control PDU is a RESET ACK PDU

Note: TDS RLC UL Ctrl_Ch27 vs time shows the same information as TDS RLC UL control vs time, but Log Ch is limited to 27.

Figure 4-2 shows an example TDS RLC control vs time grid.

Time	Log Ch	WIN	MRW_SN	MRW_ACK	RST	RST_ACK
05:43:00.074	14					1
05:43:00.430	14				1	
05:43:00.629	14				1	
05:43:00.828	14				1	
05:43:29.700	14					1
05:43:29.784	14					1
05:43:30.718	14					1
05:44:08.519	14					1
05:44:08.595	14					1
05:44:09.665	14					1

Figure 4-2 TDS RLC (DL/UL) control vs time

4.1.3 TDS RLC DlTrChPdu Tput vs time

Data source

- 0xD08F – TD-SCDMA RLC DL AM statistics
- 0x1FEE – 3D GPS information

Description

The analyzer outputs are calculated as:

- PDU Tput [Kbps] – Value calculated as the ratio of difference in total PDU bytes received, logged in adjacent log packets, and time elapsed
- SDU Tput [Kbps] – Value calculated as the ratio of difference in total SDU bytes received, logged in adjacent log packets, and time elapsed
- Resets – Number of RLC resets in the duration between two adjacent log packets
- PDU nacks – Number of PDU nacked to the network in the duration between two adjacent log packets
- PDU bytes – Total number of PDU bytes received in the duration between two adjacent log packets
- SDU bytes – Total number of SDU bytes received in the duration between two adjacent log packets
- PDUs reTx – Total number of AMD PDU bytes retransmitted between two adjacent log packets
- PDUs Tx – Total number of AMD PDU first transmission bytes between two adjacent log packets
- Cum resets – Total number of RLC resets since start of logging
- Cum PDU nacks – Total number of PDU nacked to the network since the last RLC reset
- Cum PDU bytes – Total number of PDU bytes since the last RLC reset
- Cum SDU bytes – Total number of SDU bytes since the last RLC reset
- Cum PDUs reTx – Total number of AMD PDU retransmitted since the last RLC reset
- Cum PDUs Tx – Total number of AMD PDU transmitted for first since the last RLC reset

Figure 4-3shows an example TDS RLC DlTrchPdu Tput grid.

TDS RLC DlTrChPdu Tput vs. Time
Qualcomm Proprietary and Confidential.

Time	Latitude	Longitude	PDU Tput [Kbps]	SDU T...	PDU Naks	PDU B...	SDU B...	PDUs Rx	Cum P...	Cum P...	Cum S...
1980/01/06 01:11:28.104	+39.96623	+116.32008	0.93	0.41	0	3486	1542	83	0	3486	1542
1980/01/06 01:11:49.104	+39.96597	+116.31702	68.12	63.74	0	102186	95608	2433	0	105672	97150
1980/01/06 01:11:52.104	+39.96594	+116.31672	39.76	34.66	0	14910	13000	355	0	120582	110150

Figure 4-3 TDS RLC DlTrchPdu Tput vs time

4.1.4 TDS RLC DL Tput vs time

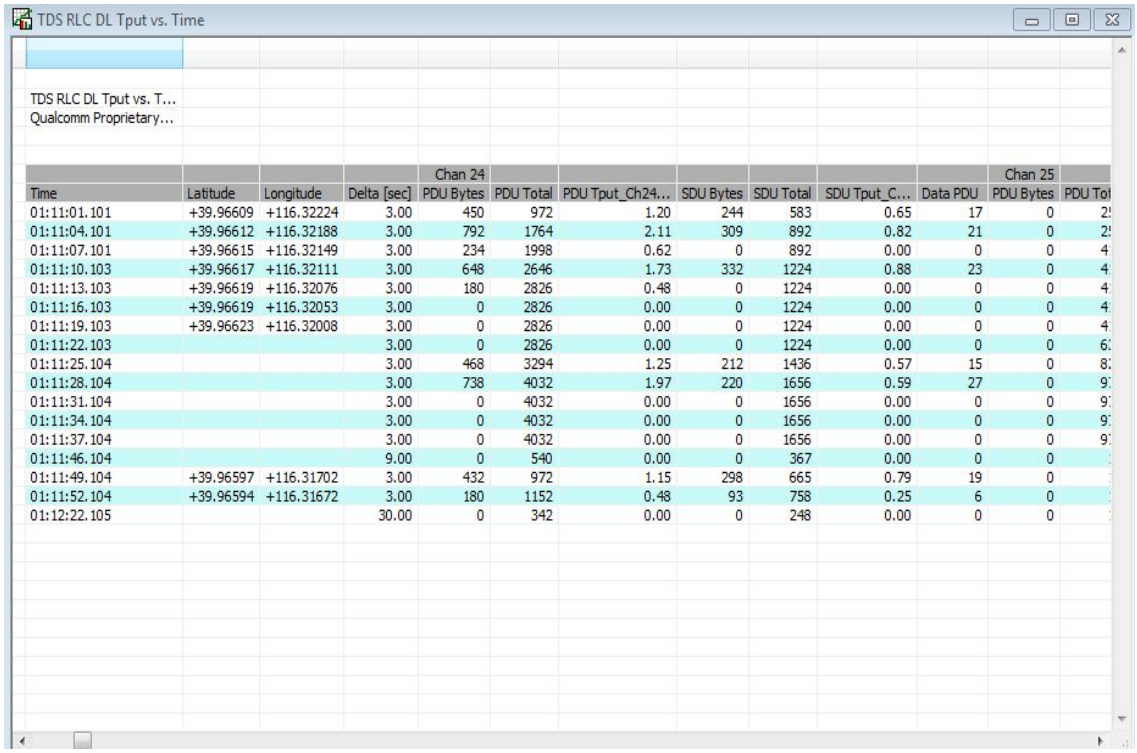
The DL RLC Tput vs time output gives the RLC AM data Tput vs time. TOT_NUM_PDU_BYTE_RXD contains the accumulated number of PDU bytes received. To calculate the throughput, a delta is used (current minus previous) divided by the time (current minus previous).

PDU throughput = (current data – previous data) / (current timestamp – previous timestamp)

A similar calculation is made for the SDU throughput using the TOT_NUM_SDU_BYTE_RXD field.

If there is an accumulator reset in the log file, which can be signaled by the TOT_NUM_PDU_BYTE_RXD being less than the previous value, the throughput calculation is restarted with the new value as the first value. Thus, the next throughput value will be calculated using the next packet (current minus previous).

Figure 4-4 shows an example Tput vs time grid. The log packet used is 0xD08F – TD-SCDMA RLC DL AM statistics.



				Chan 24							Chan 25	
Time	Latitude	Longitude	Delta [sec]	PDU Bytes	PDU Total	PDU Tput_Ch24...	SDU Bytes	SDU Total	SDU Tput_C...	Data PDU	PDU Bytes	PDU Tol
01:11:01.101	+39.96609	+116.32224	3.00	450	972	1.20	244	583	0.65	17	0	2
01:11:04.101	+39.96612	+116.32188	3.00	792	1764	2.11	309	892	0.82	21	0	2
01:11:07.101	+39.96615	+116.32149	3.00	234	1998	0.62	0	892	0.00	0	0	4
01:11:10.103	+39.96617	+116.32111	3.00	648	2646	1.73	332	1224	0.88	23	0	4
01:11:13.103	+39.96619	+116.32076	3.00	180	2826	0.48	0	1224	0.00	0	0	4
01:11:16.103	+39.96619	+116.32053	3.00	0	2826	0.00	0	1224	0.00	0	0	4
01:11:19.103	+39.96623	+116.32008	3.00	0	2826	0.00	0	1224	0.00	0	0	4
01:11:22.103			3.00	0	2826	0.00	0	1224	0.00	0	0	6
01:11:25.104			3.00	468	3294	1.25	212	1436	0.57	15	0	8
01:11:28.104			3.00	738	4032	1.97	220	1656	0.59	27	0	9
01:11:31.104			3.00	0	4032	0.00	0	1656	0.00	0	0	9
01:11:34.104			3.00	0	4032	0.00	0	1656	0.00	0	0	9
01:11:37.104			3.00	0	4032	0.00	0	1656	0.00	0	0	9
01:11:46.104			9.00	0	540	0.00	0	367	0.00	0	0	
01:11:49.104	+39.96597	+116.31702	3.00	432	972	1.15	298	665	0.79	19	0	
01:11:52.104	+39.96594	+116.31672	3.00	180	1152	0.48	93	758	0.25	6	0	
01:12:22.105			30.00	0	342	0.00	0	248	0.00	0	0	

Figure 4-4 TDS RLC DL Tput vs time grid

Figure 4-5 shows an example Tput vs time plot.

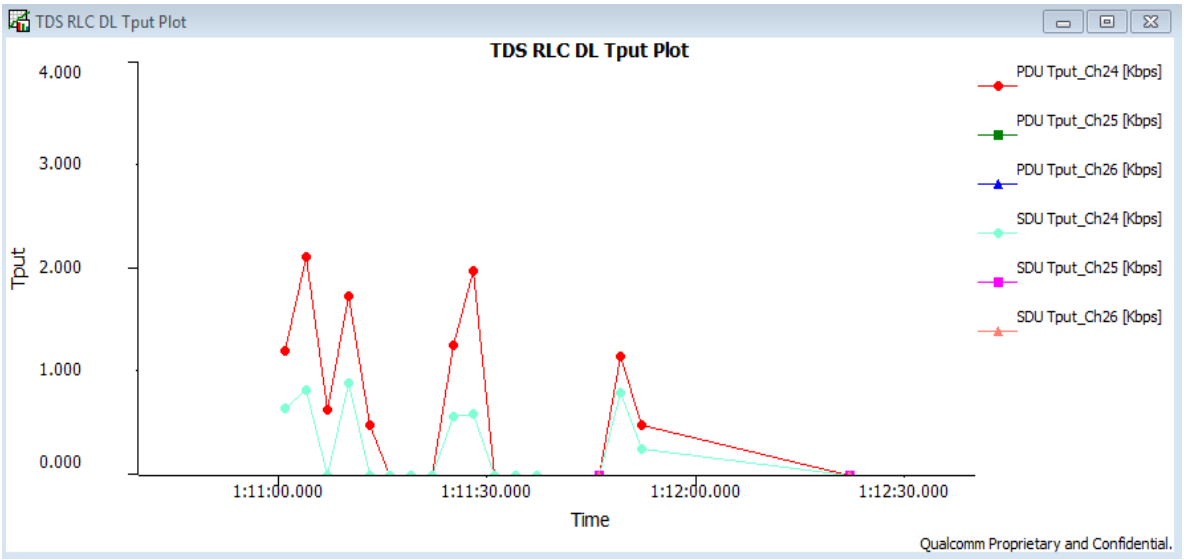


Figure 4-5 TDS RLC DL Tput vs time plot

4.1.5 TDS RLC DL Trch nacks vs time

If TD-SCDMA UL RLC AM statistics (0xD08A) and TD-SCDMA DL RLC AM statistics (0xD08F) have been received before, a new row of this grid will be output if the current TD-SCDMA UL RLC AM statistics (0xD08A) has a data channel. Either TD-SCDMA UL RLC AM statistics (0xD08A) or TD-SCDMA DL RLC AM statistics (0xD08F) has a data channel if the RLC ID ≥ 27.

PDU nacks

PDU nacks are calculated by:

(current packet)'s sum of data channel's number PDU nacks −
(previous packet)'s sum of data channel's number PDU nacks +
each data channel's wrapping,

where the wrapping is for each data channel. If the previous TD-SCDMA DL RLC AM statistics' total number of PDU nacks is greater than the current total number of PDU nacks, then the wrapping is:

= 2 << 16) - 1 - previous TD-SCDMA DL RLC AM statistics' total number of PDU nacks

otherwise, the wrapping is 0.

Data PDU

Data PDU is calculated by:

(current packet)'s sum of data channel's number of data PDU received
+ data channel's number control PDU received
+ + data channel's number of error PDU received
- (previous packet)'s sum of data channel's number of data PDU received
+ data channel's number of control PDU received
+ + data channel's number of error PDU received
+ each data channel's wrapping

where the wrapping is for each data channel. If the previous TD-SCDMA DL RLC AM statistics' number of data PDU is greater than the current TD-SCDMA DL RLC AM statistics' number of data PDU, then the wrapping is:

= 2 << 16) - 1 – previous TD-SCDMA DL RLC AM statistics' number of data PDU

otherwise, the wrapping is 0.

Longitude and latitude come from the most recent GPS packet's GPS information (0x1014), 3D GPS information (0x1FEE), or GPS information (0x1FF1) if the satellite is not lost.

Aver E_cN_0 [dB] is calculated from all packets of TD-SCDMA firmware channel estimation short (0xD10D) since the last TD-SCDMA UL RLC AM statistics (0xD08A). If the timestamp is not TS0, accumulate all of the cirSnr in linear and take the average, then convert the averaged linear cirSnr to dB using the following formula:

10*log10(avg linear / 65536.0)

Figure 4-6 shows a sample output from this analyzer.

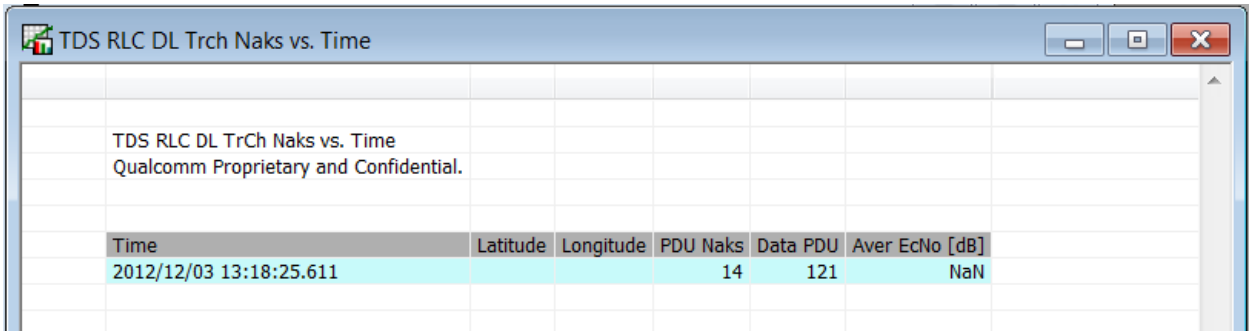


Figure 4-6 TDS RLC DL Trch nacks vs time

4.1.6 TDS RLC PDU vs time

The analyzer outputs the log channel ID, sequence number, LI, and poll fields from TD-SCDMA DL RLC AM PDU (0xD088) , TD-SCDMA DL RLC AM signaling PDU (0xD089), TD-SCDMA UL RLC AM PDU (0xD08B), and TD-SCDMA UL RLC AM signaling PDU (0xD08C). The avgTp column is the output for dl only when the sequence number is divisible by 512. To calculate the average Tput, use the following formula:

(512* current DL packet's Pdu size in bits)/duration since last such DL packet in ms

The Sn_LastinPDU column is the sequence number when LI presents.

Figure 4-7 shows an example TDS RLC PDU vs time grid.

TDS RLC PDU vs. Time
Qualcomm Proprietary and Confidential.

Time	Log Ch	SN	LI	Poll	SN_lastInSDU	avgTp (kbps)
1980/01/06 01:00:02.103	24	0		0		
1980/01/06 01:00:02.114	24	1		0		
1980/01/06 01:00:02.123	24	2		0		
1980/01/06 01:00:02.134	24	3	9	1	3	
1980/01/06 01:00:02.233	24	0		0		0.00
1980/01/06 01:00:02.233	25	0		0		
1980/01/06 01:00:02.243	24	1	13	1	1	
1980/01/06 01:00:02.243	25	1	5	1	1	
1980/01/06 01:00:02.254	24	2		0		
1980/01/06 01:00:02.263	24	3		1		
1980/01/06 01:00:02.273	24	4		0		
1980/01/06 01:00:02.283	24	5		0		
1980/01/06 01:00:02.293	24	6		0		
1980/01/06 01:00:02.303	24	7		1		
1980/01/06 01:00:02.313	24	8		0		
1980/01/06 01:00:02.323	24	9		0		
1980/01/06 01:00:02.343	24	10		0		
1980/01/06 01:00:02.353	25	0	6	1	0	614.40
1980/01/06 01:00:02.363	24	11	6	1	11	
1980/01/06 01:00:02.373	25	1		0		
1980/01/06 01:00:02.375	25	2	14	1	2	

Figure 4-7 TDS RLC PDU vs time

4.1.7 TDS RLC PDU_Ch27 vs time

It is the same as TDS RLC PDU vs time, except it only counts for channel ID 27.

4.1.8 TDS RLC UlTrchPdu Tput vs time

Data source

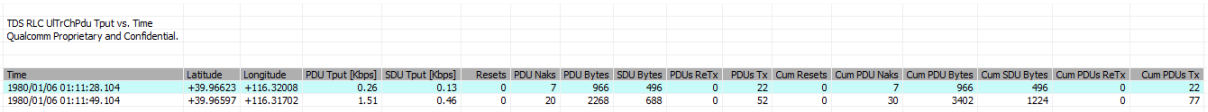
- 0xD08A – TD-SCDMA RLC UL AM statistics
- 0x1FEE – 3D GPS information

Description

The analyzer outputs are calculated as:

- PDU Tput [Kbps] – Value calculated as the ratio of difference in total PDU bytes received, logged in adjacent log packets, and time elapsed
- SDU Tput [Kbps] – Value calculated as the ratio of difference in total SDU bytes received, logged in adjacent log packets, and time elapsed
- Resets – Number of RLC resets in the duration between two adjacent log packets
- PDU nacks – Number of PDU nacked to the network in the duration between two adjacent log packets
- PDU bytes – Total number of PDU bytes received in the duration between two adjacent log packets
- SDU bytes – Total number of SDU bytes received in the duration between two adjacent log packets
- PDUs reTx – Total number of AMD PDU bytes retransmitted between two adjacent log packets
- PDUs Tx – Total number of AMD PDU first transmission bytes between two adjacent log packets
- Cum resets – Total number of RLC resets since start of logging.
- Cum PDU nacks – Total number of PDU nacked to network since last RLC reset
- Cum PDU bytes – Total number of PDU bytes since the last RLC reset
- Cum SDU bytes – Total number of SDU bytes since the last RLC reset
- Cum PDUs reTx – Total number of AMD PDU retransmitted since the last RLC reset
- Cum PDUs Tx – Total number of AMD PDU transmitted for first since the last RLC reset

Figure 4-8 shows an example TDS RLC UITrchPdu Tput vs time grid.



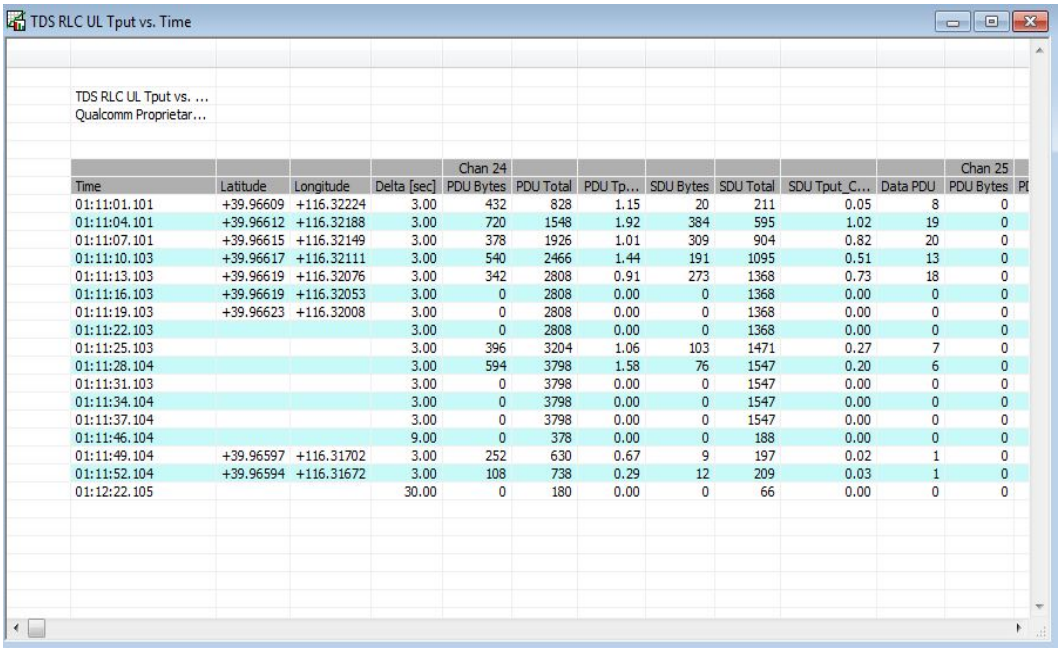
TDS RLC UlTrChPdu Tput vs. Time
Qualcomm Proprietary and Confidential.

Time	Latitude	Longitude	PDU Tput [Kbps]	SDU Tput [Kbps]	Resets	PDU Naks	PDU Bytes	SDU Bytes	PDUs ReTx	PDUs Tx	Cum Resets	Cum PDU Naks	Cum PDU Bytes	Cum SDU Bytes	Cum PDUs ReTx	Cum PDUs Tx
1980/01/06 01:11:28.104	+39.96623	+116.32008	0.26	0.13	0	7	966	496	0	22	0	7	966	496	0	22
1980/01/06 01:11:49.104	+39.96597	+116.31702	1.51	0.46	0	20	2268	688	0	52	0	30	3402	1224	0	77

Figure 4-8 TDS RLC UlTrchPdu Tput vs time

4.1.9 TDS RLC UL Tput vs time

This procedure is identical to WCDMA DL RLC Tput vs time. The log packet used is WCDMA RLC UL AM statistics (0xD088). Figure 4-9 shows an example TDS RLC UL Tput vs time grid.



				Chan 24							Chan 25	
Time	Latitude	Longitude	Delta [sec]	PDU Bytes	PDU Total	PDU Tp...	SDU Bytes	SDU Total	SDU Tput_C...	Data PDU	PDU Bytes	Pl
01:11:01.101	+39.96609	+116.32224	3.00	432	828	1.15	20	211	0.05	8	0	
01:11:04.101	+39.96612	+116.32188	3.00	720	1548	1.92	384	595	1.02	19	0	
01:11:07.101	+39.96615	+116.32149	3.00	378	1926	1.01	309	904	0.82	20	0	
01:11:10.103	+39.96617	+116.32111	3.00	540	2466	1.44	191	1095	0.51	13	0	
01:11:13.103	+39.96619	+116.32076	3.00	342	2808	0.91	273	1368	0.73	18	0	
01:11:16.103	+39.96619	+116.32053	3.00	0	2808	0.00	0	1368	0.00	0	0	
01:11:19.103	+39.96623	+116.32008	3.00	0	2808	0.00	0	1368	0.00	0	0	
01:11:22.103			3.00	0	2808	0.00	0	1368	0.00	0	0	
01:11:25.103			3.00	396	3204	1.06	103	1471	0.27	7	0	
01:11:28.104			3.00	594	3798	1.58	76	1547	0.20	6	0	
01:11:31.103			3.00	0	3798	0.00	0	1547	0.00	0	0	
01:11:34.104			3.00	0	3798	0.00	0	1547	0.00	0	0	
01:11:37.104			3.00	0	3798	0.00	0	1547	0.00	0	0	
01:11:46.104			9.00	0	378	0.00	0	188	0.00	0	0	
01:11:49.104	+39.96597	+116.31702	3.00	252	630	0.67	9	197	0.02	1	0	
01:11:52.104	+39.96594	+116.31672	3.00	108	738	0.29	12	209	0.03	1	0	
01:12:22.105			30.00	0	180	0.00	0	66	0.00	0	0	

Figure 4-9 TDS RLC UL Tput vs time grid

Figure 4-10 show an example TDS RLC UL Tput vs time plot.

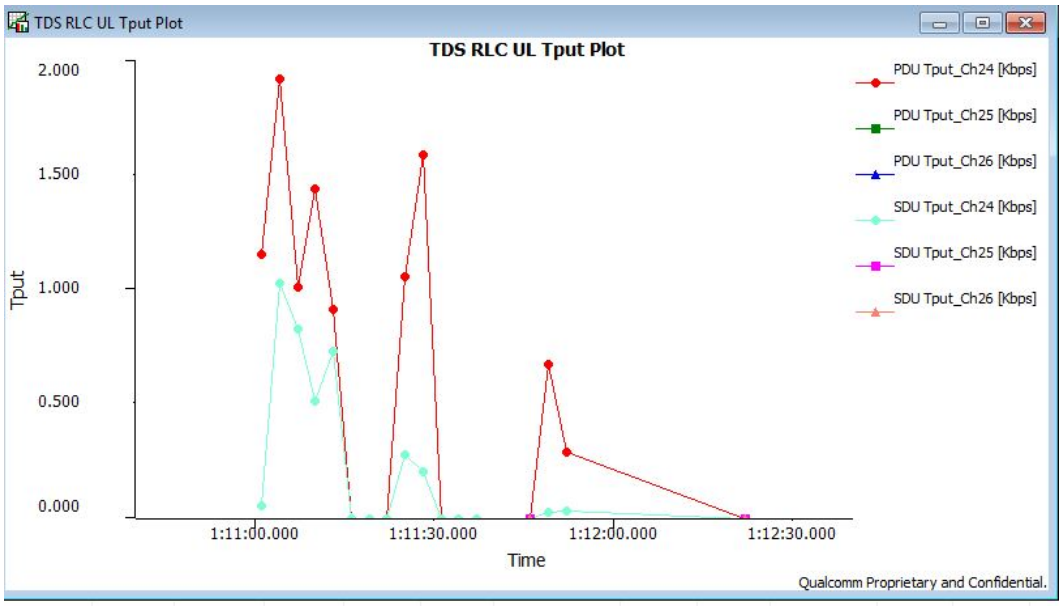


Figure 4-10 TDS RLC UL Tput vs time plot

4.2 TDS CQI code rate vs time

This plot shows the code rate field from the TD-SCDMA firmware CQI (0xD121) packet. Figure 4-11 shows an example TDS CQI code rate vs time grid.

TDSCDMA CQI Code Rate vs. Time
Qualcomm Proprietary and Confidential.

Time	Code Rate
2012/10/12 23:07:27.089	0.58
2012/10/12 23:07:27.109	0.58
2012/10/12 23:07:27.113	0.58
2012/10/12 23:07:27.148	0.58
2012/10/12 23:07:27.169	0.58
2012/10/12 23:07:27.188	0.58
2012/10/12 23:07:27.208	0.58
2012/10/12 23:07:27.228	0.58
2012/10/12 23:07:27.248	0.58
2012/10/12 23:07:27.268	0.58
2012/10/12 23:07:27.288	0.58
2012/10/12 23:07:27.294	0.58
2012/10/12 23:07:27.299	0.58
2012/10/12 23:07:27.308	0.58
2012/10/12 23:07:27.319	0.58
2012/10/12 23:07:27.329	0.58
2012/10/12 23:07:27.353	0.58
2012/10/12 23:07:27.388	0.58
2012/10/12 23:07:27.408	0.58
2012/10/12 23:07:27.413	0.58
2012/10/12 23:07:27.418	0.58

Figure 4-11 TDS CQI code rate vs time grid

Figure 4-12 shows an example TDS CQI code rate vs time plot.

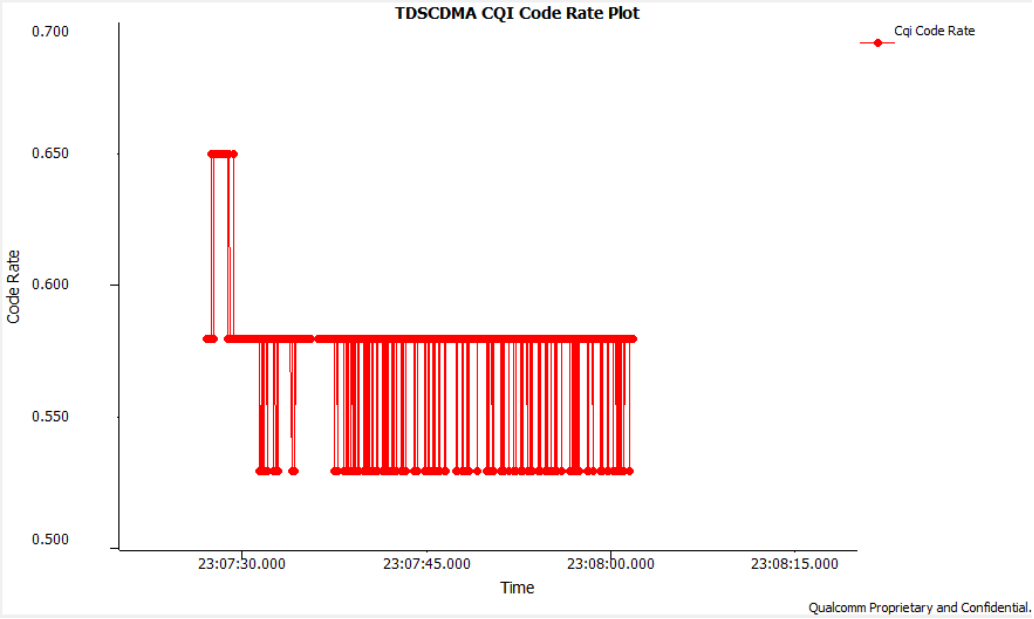


Figure 4-12 TDS CQI code rate vs time plot

4.3 TDS CQI Rtbs vs time

This plot shows the Rtbs field from the TD-SCDMA firmware CQI (0xD121) packet. Figure 4-13 shows an example TD-SCDMA CQI Rtbs vs time grid.

TDS CQI Rtbs vs. Time
Qualcomm Proprietary and Confidential.

Time	RTBS	RMF
2012/10/12 23:07:27.089	46	1
2012/10/12 23:07:27.109	40	1
2012/10/12 23:07:27.113	40	1
2012/10/12 23:07:27.148	30	1
2012/10/12 23:07:27.169	30	1
2012/10/12 23:07:27.188	30	1
2012/10/12 23:07:27.208	30	1
2012/10/12 23:07:27.228	30	1
2012/10/12 23:07:27.248	30	1
2012/10/12 23:07:27.268	30	1
2012/10/12 23:07:27.288	46	1
2012/10/12 23:07:27.294	30	1
2012/10/12 23:07:27.299	30	1
2012/10/12 23:07:27.308	30	1
2012/10/12 23:07:27.319	46	1
2012/10/12 23:07:27.329	30	1
2012/10/12 23:07:27.353	30	1
2012/10/12 23:07:27.388	40	1
2012/10/12 23:07:27.408	40	1
2012/10/12 23:07:27.413	40	1
2012/10/12 23:07:27.418	40	1
2012/10/12 23:07:27.428	30	1
2012/10/12 23:07:27.443	46	1
2012/10/12 23:07:27.449	46	1
2012/10/12 23:07:27.468	48	1
2012/10/12 23:07:27.474	48	1
2012/10/12 23:07:27.488	31	1
2012/10/12 23:07:27.508	31	1

Figure 4-13 TDS CQI Rtbs vs time grid

Figure 4-14 shows an example TDS CQI Rtbs vs time plot.

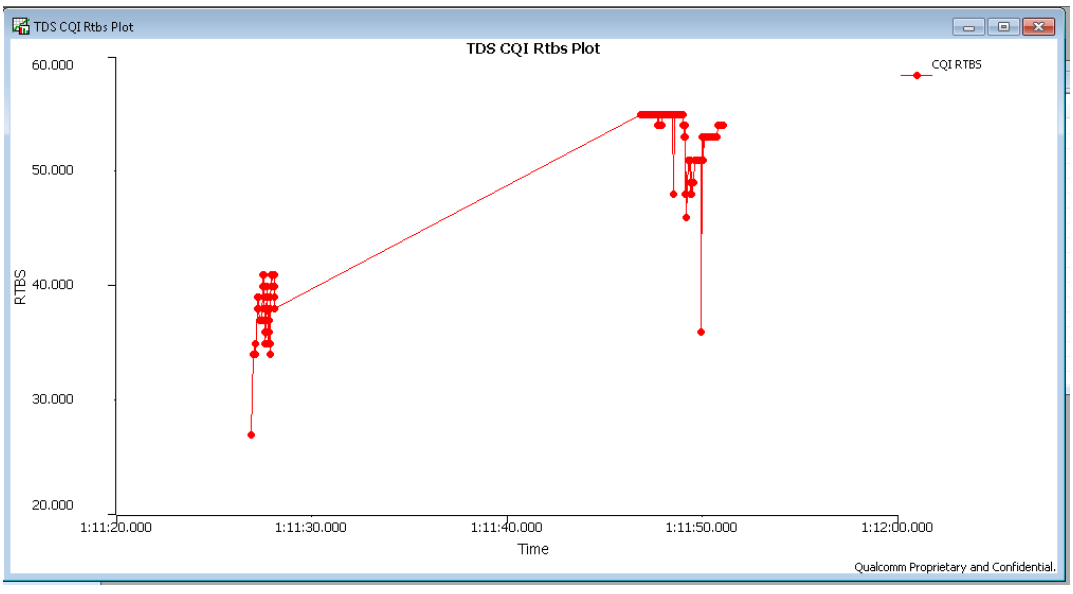


Figure 4-14 TDS CQI Rtbs vs time plot

4.4 TDS Cir Peaks vs time

The TDS Cir Peaks vs time for CIR taps positions is given in a tabular format for easy analysis. The following table is only for TS0 although this log packet can be generated for different TSs. Figure 4-15 shows an example of TDS Cir Peaks vs time.

TDS Cir Peaks vs. Time
Qualcomm Proprietary and Confidential.

	MIDAMBLE CIR TS0					DWPTS CIR TS0				
Time	Midamble ID	Freq (KHz)	Tap position	Indices	EcIo	Midamble ID	Freq (KHz)	Tap position	Indices	EcIo
2013/01/09 21:11:01.861	11	2024000000	0	-13.37	38	11	2024000000	0	-18.15	92
			1	-14.72	20			1	-18.41	91
			2	-14.75	7			2	-18.71	88
			3	-14.82	0			3	-18.77	84
			4	-14.87	32			4	-18.81	106
			5	-14.92	19			5	-18.84	93
			6	-15.50	33			6	-19.09	111
			7	-15.59	6			7	-19.14	85
2013/01/09 21:11:01.865	113	2016000000	0	-9.80	61	113	2016000000	0	-15.61	23
			1	-14.45	21			1	-15.69	105
			2	-15.13	5			2	-17.10	31
			3	-15.58	51			3	-17.21	15
			4	-17.21	20			4	-18.03	56
			5	-128.00	2			5	-20.01	67
			6	-128.00	6			6	-21.38	60
			7	-128.00	7			7	-128.00	7
2013/01/09 21:11:01.961	11	2024000000	0	-13.65	3	11	2024000000	0	-18.53	105
			1	-16.79	9			1	-18.59	8
			2	-17.00	21			2	-18.64	70
			3	-17.16	23			3	-18.99	81
			4	-18.28	31			4	-19.14	43
			5	-18.64	8			5	-19.58	74
			6	-18.66	4			6	-20.13	104
			7	-18.70	58			7	-20.39	90
2013/01/09 21:11:01.965	11	2024000000	0	-13.37	2	11	2024000000	0	-18.25	90
			1	-13.88	26			1	-18.83	77
			2	-14.44	0			2	-18.93	99
			3	-14.70	7			3	-19.42	59
			4	-14.82	28			4	-19.49	81
			5	-15.22	63			5	-19.69	82
			6	-15.55	6			6	-19.80	12
			7	-15.60	8			7	-19.80	95

Figure 4-15 TDS Cir Peaks vs time

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4.5 TDS CQI Ses vs time

This plot shows the seAdj, seAvg, and seEff fields from the TD-SCDMA firmware CQI (0xD121) packet. Figure 4-16 shows an example TDS CQI Ses vs time grid.

TDSCDMA CQI Ses vs. Time
Qualcomm Proprietary and Confidential.

Time	seAdj	seAvg	seEff
2012/10/12 23:07:27.089	3.06	3.06	3.06
2012/10/12 23:07:27.109	2.90	3.06	3.01
2012/10/12 23:07:27.113	3.06	3.07	3.15
2012/10/12 23:07:27.148	3.06	3.07	3.06
2012/10/12 23:07:27.169	2.90	3.05	2.90
2012/10/12 23:07:27.188	2.90	3.03	2.90
2012/10/12 23:07:27.208	2.90	3.04	3.06
2012/10/12 23:07:27.228	2.90	3.06	3.23
2012/10/12 23:07:27.248	2.90	3.04	2.90
2012/10/12 23:07:27.268	2.90	2.98	2.44
2012/10/12 23:07:27.288	2.90	3.01	3.23
2012/10/12 23:07:27.294	3.06	3.09	3.80
2012/10/12 23:07:27.299	3.06	3.07	2.90
2012/10/12 23:07:27.308	3.06	3.07	3.06
2012/10/12 23:07:27.319	2.90	3.06	3.01
2012/10/12 23:07:27.329	3.06	3.08	3.23
2012/10/12 23:07:27.353	3.06	3.09	3.23
2012/10/12 23:07:27.388	3.06	3.14	3.56
2012/10/12 23:07:27.408	3.06	3.12	2.90
2012/10/12 23:07:27.413	3.06	3.15	3.48
2012/10/12 23:07:27.418	3.06	3.18	3.40
2012/10/12 23:07:27.428	3.06	3.20	3.39
2012/10/12 23:07:27.443	3.06	3.21	3.31

Figure 4-16 TDS CQI Ses vs time grid

Figure 4-17 shows an example TDS CQI Ses vs time plot.

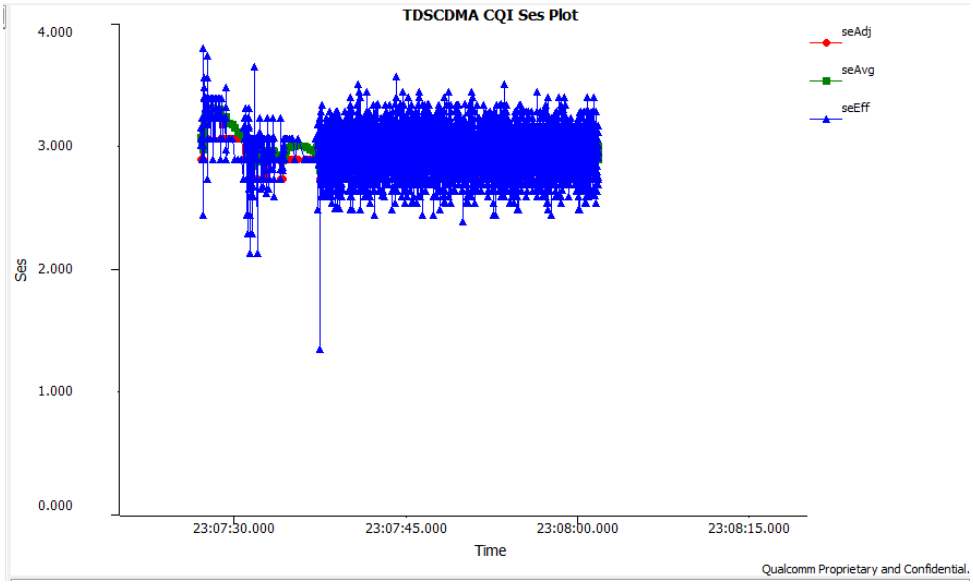

Figure 4-17 TDS CQI Ses vs time plot

4.6 TDS Dl power control vs time

This grid shows the HS-SCCH target SIR, HS-SCCH SIR, and HS-SCCH TPC from the TD-SCDMA firmware HSSCCH decoding results (0xD124) packet. Figure 4-18 shows an example TDS Dl power control vs time grid.

TDS Dl Power Control vs. Time
Qualcomm Proprietary and Confidential.

Time	HS-SCCH Target SIR	HS-SCCH SIR	TPC
2012/12/15 00:24:28.580	0.00	24.80	0
2012/12/15 00:24:28.585	2.60	25.40	0
2012/12/15 00:24:28.590	2.60	27.20	0
2012/12/15 00:24:28.595	2.60	26.60	0
2012/12/15 00:24:28.620	2.60	13.40	0
2012/12/15 00:24:28.820	2.60	23.60	0
2012/12/15 00:24:28.830	2.60	17.00	0
2012/12/15 00:24:28.900	2.60	25.40	0
2012/12/15 00:24:28.940	2.60	19.40	0
2012/12/15 00:24:29.000	2.60	24.20	0
2012/12/15 00:24:29.040	2.60	22.40	0
2012/12/15 00:24:29.080	2.60	20.60	0
2012/12/15 00:24:29.100	2.60	24.20	0
2012/12/15 00:24:29.105	2.60	24.80	0
2012/12/15 00:24:29.110	2.60	23.00	0
2012/12/15 00:24:29.140	2.60	18.20	0
2012/12/15 00:24:29.180	2.60	21.80	0
2012/12/15 00:24:29.200	2.60	18.80	0
2012/12/15 00:24:29.220	2.60	18.80	0
2012/12/15 00:24:29.280	2.60	21.80	0
2012/12/15 00:24:29.330	2.60	24.80	0
2012/12/15 00:24:29.380	2.60	23.60	0
2012/12/15 00:24:29.460	2.60	25.40	0
2012/12/15 00:24:29.500	2.60	25.40	0
2012/12/15 00:24:29.560	2.60	24.20	0
2012/12/15 00:24:29.580	2.60	21.80	0
2012/12/15 00:24:29.600	2.60	20.60	0
2012/12/15 00:24:29.640	2.60	20.60	0
2012/12/15 00:24:29.680	2.60	18.80	0
2012/12/15 00:24:29.720	2.60	20.60	0

Figure 4-18 TDS Dl power control vs time grid

4.7 TDS HSDPA Bler vs time

This plot shows the Bler of Transmission every 2 sec from the TD-SCDMA L1 HSDPA HARQ statistics (0xD033) packet. Figure 4-19 shows an example TDS HSDPA Bler vs time grid.

TDS HSDPA Bler vs. Time
Qualcomm Proprietary and Confidential.

Time	BLER 2Secs
2012/12/15 00:23:17.728	0
2012/12/15 00:24:28.688	0
2012/12/15 00:24:31.248	2
2012/12/15 00:24:33.808	0
2012/12/15 00:24:36.368	0
2012/12/15 00:24:38.928	0
2012/12/15 00:24:41.486	0
2012/12/15 00:24:44.048	0
2012/12/15 00:24:46.608	0
2012/12/15 00:24:49.168	0
2012/12/15 00:24:51.728	0
2012/12/15 00:24:54.288	0
2012/12/15 00:24:56.848	3
2012/12/15 00:24:59.408	0
2012/12/15 00:25:01.968	0
2012/12/15 00:25:04.528	0
2012/12/15 00:25:07.088	0
2012/12/15 00:25:09.648	0
2012/12/15 00:25:12.208	0
2012/12/15 00:25:14.768	0
2012/12/15 00:25:17.328	0
2012/12/15 00:25:19.888	0
2012/12/15 00:25:22.448	0
2012/12/15 00:25:25.008	0

Figure 4-19 TDS HSDPA Bler vs time grid

Figure 4-20 shows an example TDS HSDPA Bler vs time plot.

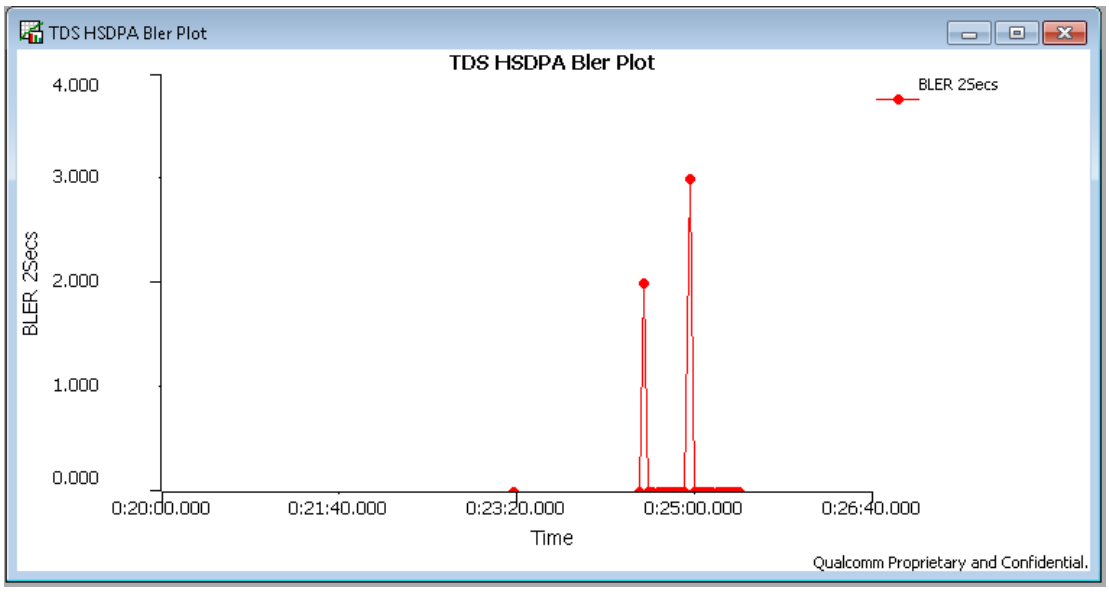

Figure 4-20 TDS HDSPA Bler vs time plot

4.8 TDS HSSCCH schedule vs time

This plot shows the HSSCCH scheduling from the TDSCDMA L1 HSDPA HSSCCH statistics (0xD032) packet. Figure 4-21 shows an example TDS HSSCCH schedule vs time grid.

TDSCDMA HSSCCH Sched vs. Time
Qualcomm Proprietary and Confidential.

Time	Num Scch Valid
2012/10/12 23:07:28.970	62
2012/10/12 23:07:31.530	69
2012/10/12 23:07:34.090	25
2012/10/12 23:07:36.650	330
2012/10/12 23:07:39.210	492
2012/10/12 23:07:41.770	512
2012/10/12 23:07:44.330	512
2012/10/12 23:07:46.890	512
2012/10/12 23:07:49.450	512
2012/10/12 23:07:52.010	512
2012/10/12 23:07:54.570	512
2012/10/12 23:07:57.130	512
2012/10/12 23:07:59.690	512

Figure 4-21 TDS HSSCCH schedule vs time grid

Figure 4-22 shows an example TDS HSSCCH schedule vs time plot.

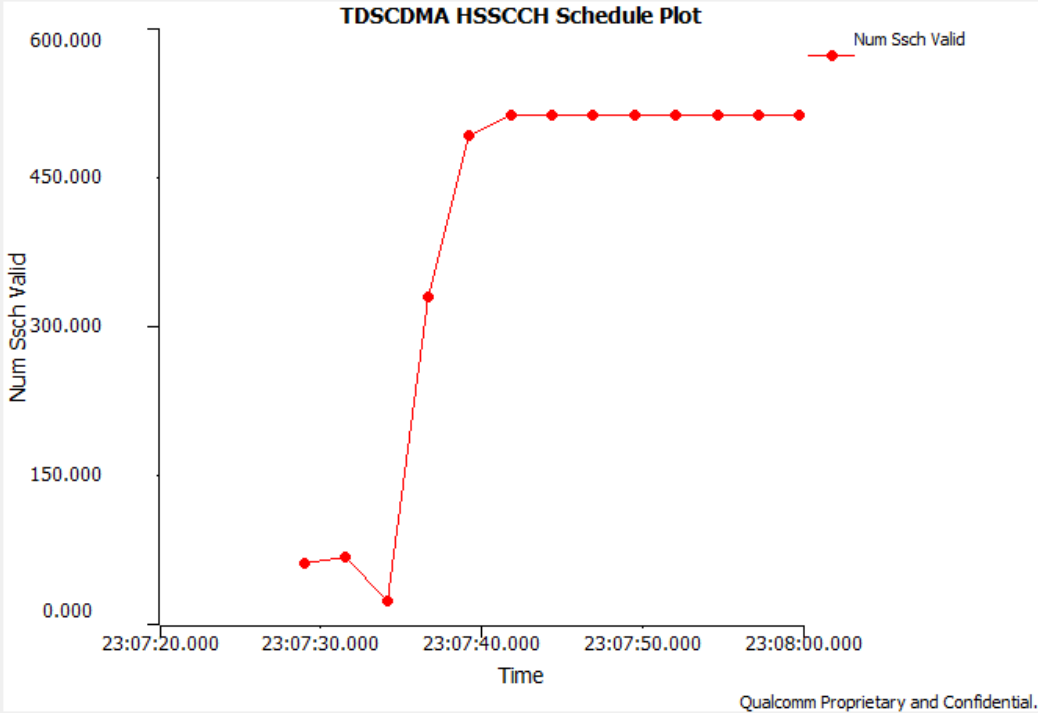

Figure 4-22 TDS HSSCCH schedule vs time plot

4.9 TDS HSSCCH TS vs time

This plot shows the TS field from the TD-SCDMA firmware HSSCCH decoding results (0xD124) packet. Figure 4-23 shows an example TDS HSSCCH TS vs time grid.

TDSCDMA HSSCCH TS vs. Time
Qualcomm Proprietary and Confidential.

Time	Time Slot
2012/10/12 23:07:27.101	3
2012/10/12 23:07:27.108	3
2012/10/12 23:07:27.141	3
2012/10/12 23:07:27.161	3
2012/10/12 23:07:27.181	3
2012/10/12 23:07:27.201	3
2012/10/12 23:07:27.221	3
2012/10/12 23:07:27.241	3
2012/10/12 23:07:27.261	3
2012/10/12 23:07:27.281	3
2012/10/12 23:07:27.286	3
2012/10/12 23:07:27.293	3
2012/10/12 23:07:27.301	3
2012/10/12 23:07:27.311	3
2012/10/12 23:07:27.321	3
2012/10/12 23:07:27.346	3
2012/10/12 23:07:27.381	3
2012/10/12 23:07:27.401	3
2012/10/12 23:07:27.406	3
2012/10/12 23:07:27.413	3
2012/10/12 23:07:27.421	3
2012/10/12 23:07:27.436	3
2012/10/12 23:07:27.443	3

Figure 4-23 TDS HSSCCH TS vs time grid

Figure 4-24 shows an example TDS HSSCCH TS vs time plot.

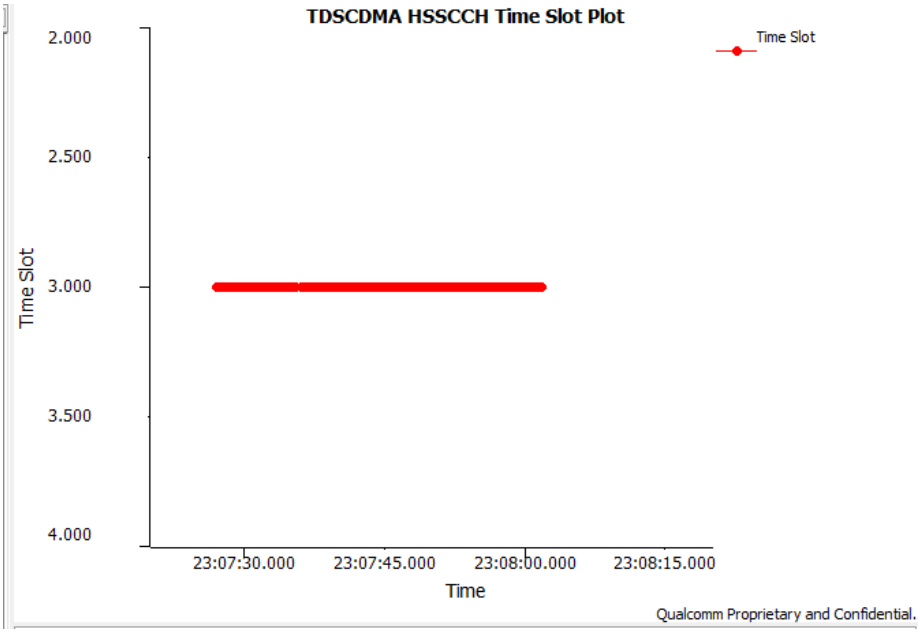

Figure 4-24 TDSCDMA HSSCCH TS vs time plot

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4.10 TDS HSUPA avg E-TFCI vs time

This plot shows the avg E-TFCI value from the TD-SCDMA L1 UPA statistics info (0xD048) packet. This plot lets us know if we are transmitting with maximum E-TFCI when possible. A lower E-TFCI leads to lower throughput which can be determined with this plot. This analyzer plots the total sum of E-TFCI across all subframes averaged by the total number of new transmissions. To plot TDS HSUPA average E-TFCI across timestamps, use the following equation:

If num_new_tx = 0,then HSUPA average E-TFCI = 0

Else HSUPA average E-TFCI = sum_etfci / num_new_tx

Figure 4-25 shows an example TDS HSUPA avg E-TFCI vs time grid.

TDS HSUPA Avg E-TFCI vs. Time
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Time	Avg ETFCI
1980/01/06 00:05:51.984	0.00
1980/01/06 00:05:52.985	20.67
1980/01/06 00:05:53.985	15.50
1980/01/06 00:05:54.985	0.00
1980/01/06 00:05:55.985	22.55
1980/01/06 00:05:56.985	15.50
1980/01/06 00:05:57.985	0.00
1980/01/06 00:05:58.985	15.50
1980/01/06 00:05:59.985	15.50
1980/01/06 00:06:00.985	0.00
1980/01/06 00:06:01.985	7.75
1980/01/06 00:06:02.985	0.00
1980/01/06 00:06:03.985	0.00
1980/01/06 00:06:04.985	7.75
1980/01/06 00:06:05.984	7.75
1980/01/06 00:06:06.984	0.00
1980/01/06 00:06:07.985	15.50
1980/01/06 00:06:08.985	7.75
1980/01/06 00:06:09.985	15.50
1980/01/06 00:06:10.984	7.75
1980/01/06 00:06:11.985	0.00
1980/01/06 00:06:12.985	15.50
1980/01/06 00:06:13.985	15.50
1980/01/06 00:06:14.985	0.00
1980/01/06 00:06:15.985	15.50
1980/01/06 00:06:16.985	15.50
1980/01/06 00:06:17.985	15.50
1980/01/06 00:06:18.985	31.89
1980/01/06 00:06:19.985	53.42

Figure 4-25 TDS HSUPA avg E-TFCI vs time grid

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Figure 4-26 shows an example TDS HSUPA avg E-TFCI vs time plot.

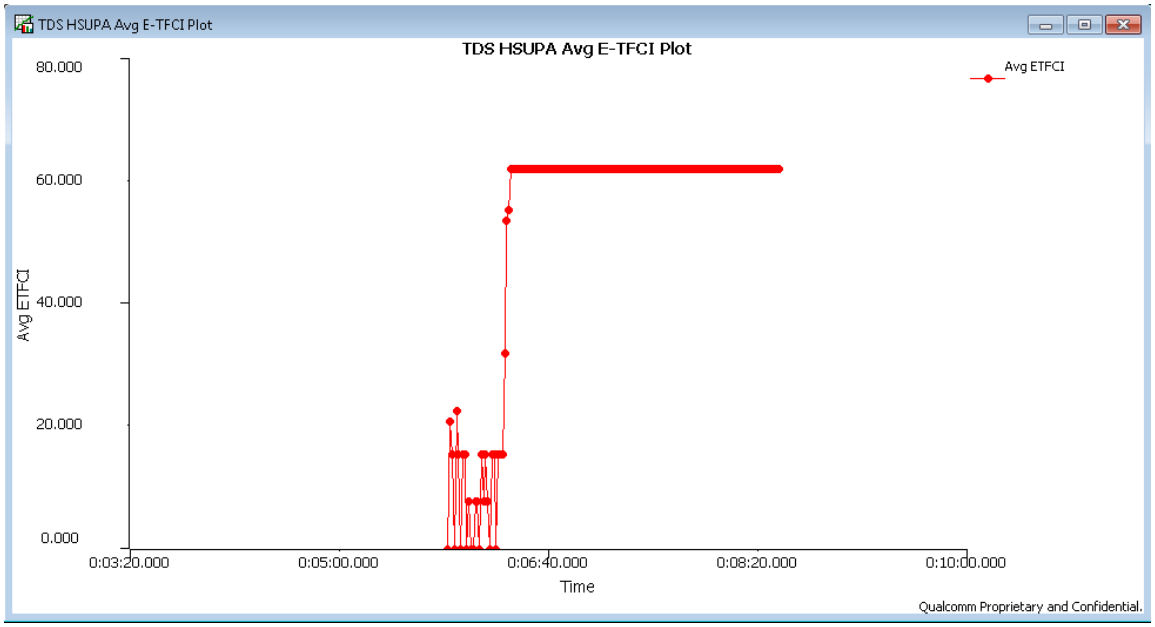

Figure 4-26 TDS HSUPA vg E-TFCI vs time plot

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4.11 TDS HSUPA BuffStatus vs time

This plot shows the sum_s_buf field from the TD-SCDMA L1 UPA statistics info (0xD048) packet. This plot gives information about the amount of data the UE has in its buffer for transmission upon receiving a grant. This helps to identify issues regarding buffer starvation.

Figure 4-27 shows an example TDS HSUPA BuffStatus vs time grid.

TDS HSUPA BuffStatus vs. Time
Qualcomm Proprietary and Confidential.

Time	Buffer Status
1980/01/06 00:05:51.984	0
1980/01/06 00:05:52.985	0
1980/01/06 00:05:53.985	0
1980/01/06 00:05:54.985	0
1980/01/06 00:05:55.985	0
1980/01/06 00:05:56.985	0
1980/01/06 00:05:57.985	0
1980/01/06 00:05:58.985	0
1980/01/06 00:05:59.985	0
1980/01/06 00:06:00.985	0
1980/01/06 00:06:01.985	0
1980/01/06 00:06:02.985	0
1980/01/06 00:06:03.985	0
1980/01/06 00:06:04.985	0
1980/01/06 00:06:05.984	0
1980/01/06 00:06:06.984	0
1980/01/06 00:06:07.985	0

Figure 4-27 TDS HSUPA BuffStatus vs time grid

Figure 4-28 shows an example TDS HSUPA BuffStatus vs time plot.

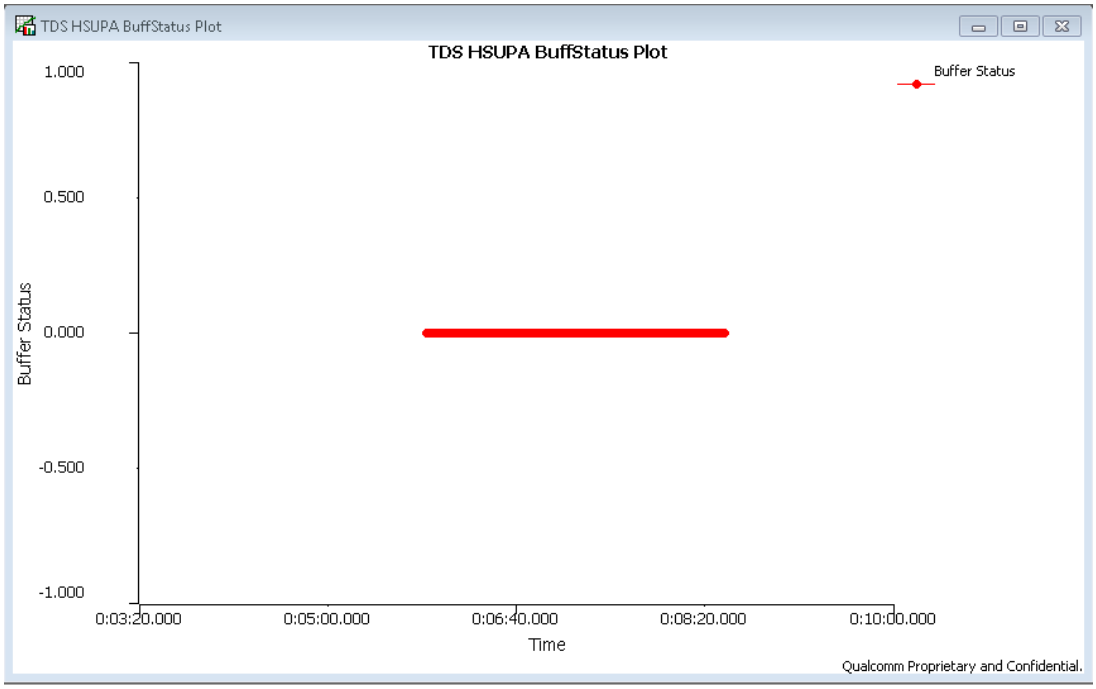

Figure 4-28 TDS HSUPA BuffStatus vs time plot

4.12 TDS HSUPA EPUCH TxPwr vs time

This plot shows the average Tx power from the TD-SCDMA L1 UPA statistics info (0xD048) packet. The plot gives information about the average EPUCH transmission power which is helpful in determining whether UE is limited by transmit power headroom. This plots the sum of EPUCH Transmit power averaged by the total number of subframes for which the serving grant was received.

The following equation is used to plot the average transmit power across timestamps:

If num_sg_avail_sub_frames = 2,

then HSUPA E-PUCH average transmit power = 0;

Else, HSUPA E-PUCH average transmit power = sum_epuch_pwr / num_sg_avail_sub_frames

Figure 4-29 shows an example TDS HSUPA EPUCH TxPwr vs time grid.

TDS HSUPA EPUCH TxPwr vs. Time
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Time	Avg Transmit Power
1980/01/06 00:05:51.984	0.00
1980/01/06 00:05:52.985	-9.05
1980/01/06 00:05:53.985	-18.32
1980/01/06 00:05:54.985	0.00
1980/01/06 00:05:55.985	-11.86
1980/01/06 00:05:56.985	-19.25
1980/01/06 00:05:57.985	0.00
1980/01/06 00:05:58.985	-7.25
1980/01/06 00:05:59.985	-7.25
1980/01/06 00:06:00.985	0.00
1980/01/06 00:06:01.985	-6.88
1980/01/06 00:06:02.985	0.00
1980/01/06 00:06:03.985	0.00
1980/01/06 00:06:04.985	-6.88
1980/01/06 00:06:05.984	-6.88
1980/01/06 00:06:06.984	0.00
1980/01/06 00:06:07.985	-6.25
1980/01/06 00:06:08.985	-6.88
1980/01/06 00:06:09.985	-7.25
1980/01/06 00:06:10.984	-6.88
1980/01/06 00:06:11.985	0.00
1980/01/06 00:06:12.985	-6.25
1980/01/06 00:06:13.985	-6.25
1980/01/06 00:06:14.985	0.00
1980/01/06 00:06:15.985	-6.25
1980/01/06 00:06:16.985	-8.25
1980/01/06 00:06:17.985	-7.75

Figure 4-29 TDS HSUPA EPUCH TxPwr vs time grid

Figure 4-30 shows an example TDS HSUPA EPUCH TxPwr vs time plot.

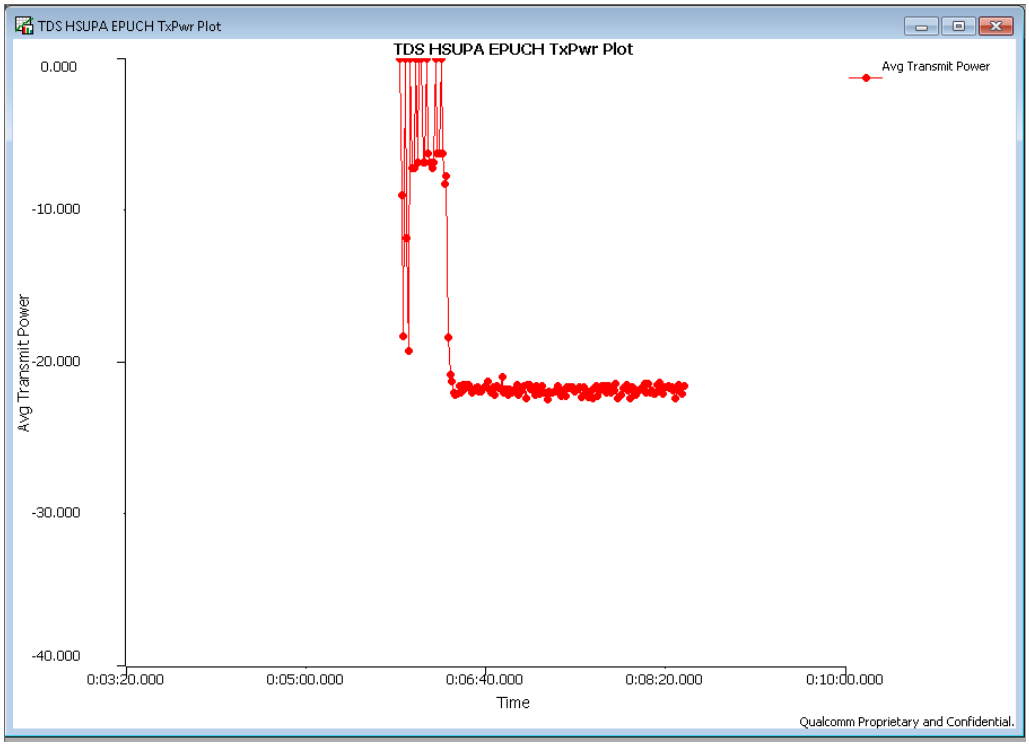

Figure 4-30 TDS HSUPA EPUCH TxPwr vs time plot

4.13 TDS HSUPA Harq Fail vs. time

This plot shows the number of failures per HARQ process id from the TD-SCDMA L1 UPA statistics info (0xD048) packet. Figure 4-31 shows an example of TDS HSUPA Harq Fail vs time grid.

TDS HSUPA Harq Fail vs. Time
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Time	Id0 Num Harq Fail	Id1 Num Harq Fail	Id2 Num Harq Fail	Id3 Num Harq Fail
1980/01/06 00:25:29.166	0	0	0	0
1980/01/06 00:25:30.166	0	0	0	0
1980/01/06 00:25:31.166	0	0	0	0
1980/01/06 00:25:32.166	0	0	0	0
1980/01/06 00:25:33.166	0	0	0	0
1980/01/06 00:25:34.166	0	0	0	0
1980/01/06 00:25:35.166	0	0	0	0
1980/01/06 00:25:36.166	0	0	0	0
1980/01/06 00:25:37.166	0	0	0	0
1980/01/06 00:25:38.166	0	0	0	0
1980/01/06 00:25:39.166	0	0	0	0
1980/01/06 00:25:40.166	0	0	0	0
1980/01/06 00:25:41.166	0	0	0	0
1980/01/06 00:25:42.166	0	0	0	0
1980/01/06 00:25:43.166	0	0	0	0
1980/01/06 00:25:44.166	0	0	0	0
1980/01/06 00:25:45.166	0	0	0	0
1980/01/06 00:25:46.166	0	0	0	0
1980/01/06 00:25:47.166	0	0	0	0
1980/01/06 00:25:48.166	0	0	0	0
1980/01/06 00:25:49.166	0	0	0	0
1980/01/06 00:25:50.166	0	0	0	0
1980/01/06 00:25:51.166	0	0	0	0
1980/01/06 00:25:52.166	0	0	0	0

Figure 4-31 TDS HSUPA Harq Fail vs time grid

4.14 TDS HSUPA path loss vs time

This plot shows the curr_pathloss field from the TD-SCDMA L1 UPA statistics info (0xD048) packet. It gives information regarding the current channel conditions, to determine if the throughput observed corresponds to the path loss seen. It also helps verify that the SNPL calculation is as expected.

Figure 4-32 shows an example TDS HSUPA path loss vs time grid.

TDS HSUPA Path Loss vs. Time
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Time	Path Loss
1980/01/06 00:05:51.984	71
1980/01/06 00:05:52.985	71
1980/01/06 00:05:53.985	71
1980/01/06 00:05:54.985	71
1980/01/06 00:05:55.985	71
1980/01/06 00:05:56.985	71
1980/01/06 00:05:57.985	71
1980/01/06 00:05:58.985	71
1980/01/06 00:05:59.985	71
1980/01/06 00:06:00.985	71
1980/01/06 00:06:01.985	71
1980/01/06 00:06:02.985	71
1980/01/06 00:06:03.985	71
1980/01/06 00:06:04.985	71
1980/01/06 00:06:05.984	71
1980/01/06 00:06:06.984	71
1980/01/06 00:06:07.985	71
1980/01/06 00:06:08.985	71
1980/01/06 00:06:09.985	71
1980/01/06 00:06:10.984	71
1980/01/06 00:06:11.985	71
1980/01/06 00:06:12.985	71
1980/01/06 00:06:13.985	71
1980/01/06 00:06:14.985	71
1980/01/06 00:06:15.985	71
1980/01/06 00:06:16.985	71
1980/01/06 00:06:17.985	71
1980/01/06 00:06:18.985	71

Figure 4-32 TDS HSUPA path loss vs time grid

Figure 4-33 shows an example TDS HSUPA path loss vs time plot.

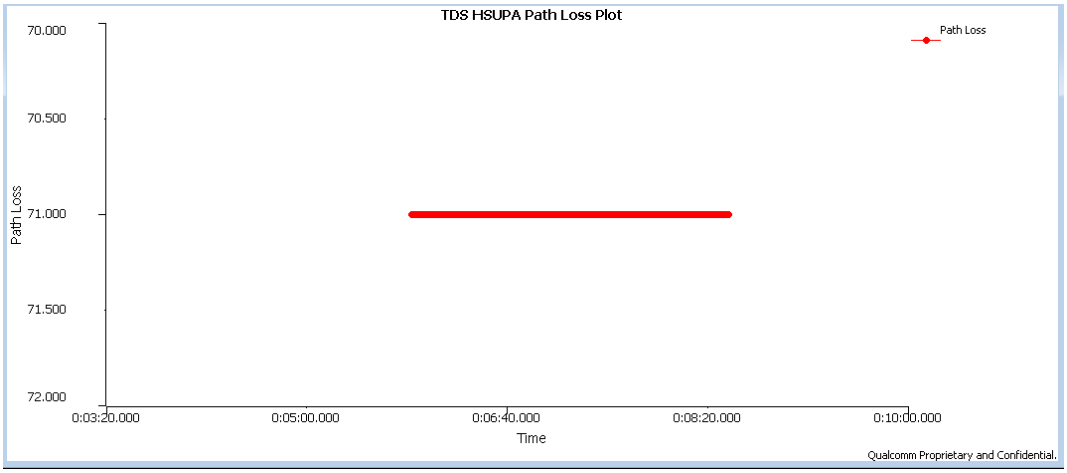

Figure 4-33 TDS HSUPA path loss vs time plot

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4.15 TDS HSUPA Sg UPH vs time

This plot shows the num_sg_maller_than_uph (number of serving grants smaller than UPH) field from the TD-CDMA L1 UPA statistics info (0xD048) packet. This plot gives information to determine whether the UE is limited by the network grant in spite of UE having power headroom. Ideally this values should equal to 0. This plots the number of serving grants received which are smaller than the available transmit power headroom.

Figure 4-34 shows an example of TDS HSUPA Sg UPH vs time grid.

TDS HSUPA Sg UPH vs. Time
Qualcomm Proprietary and Confidential.

Time	Scheduled Buffer Status
1980/01/06 00:25:29.166	0
1980/01/06 00:25:30.166	0
1980/01/06 00:25:31.166	0
1980/01/06 00:25:32.166	0
1980/01/06 00:25:33.166	0
1980/01/06 00:25:34.166	0
1980/01/06 00:25:35.166	0
1980/01/06 00:25:36.166	9
1980/01/06 00:25:37.166	7
1980/01/06 00:25:38.166	0
1980/01/06 00:25:39.166	2
1980/01/06 00:25:40.166	1
1980/01/06 00:25:41.166	0
1980/01/06 00:25:42.166	2
1980/01/06 00:25:43.166	1
1980/01/06 00:25:44.166	1
1980/01/06 00:25:45.166	1
1980/01/06 00:25:46.166	3
1980/01/06 00:25:47.166	0
1980/01/06 00:25:48.166	0
1980/01/06 00:25:49.166	0
1980/01/06 00:25:50.166	0
1980/01/06 00:25:51.166	0
1980/01/06 00:25:52.166	0
1980/01/06 00:25:53.166	0
1980/01/06 00:25:54.166	3
1980/01/06 00:25:55.166	7
1980/01/06 00:25:56.166	19
1980/01/06 00:25:57.166	7
1980/01/06 00:25:58.166	0
1980/01/06 00:25:59.166	0
1980/01/06 00:26:00.166	0
1980/01/06 00:26:01.166	0
1980/01/06 00:26:02.166	0
1980/01/06 00:26:03.166	0
1980/01/06 00:26:04.166	0

Figure 4-34 TDS HSUPA Sg UPH vs time grid

Figure 4-35 shows an example of TDS HSUPA Sg UPH plot.

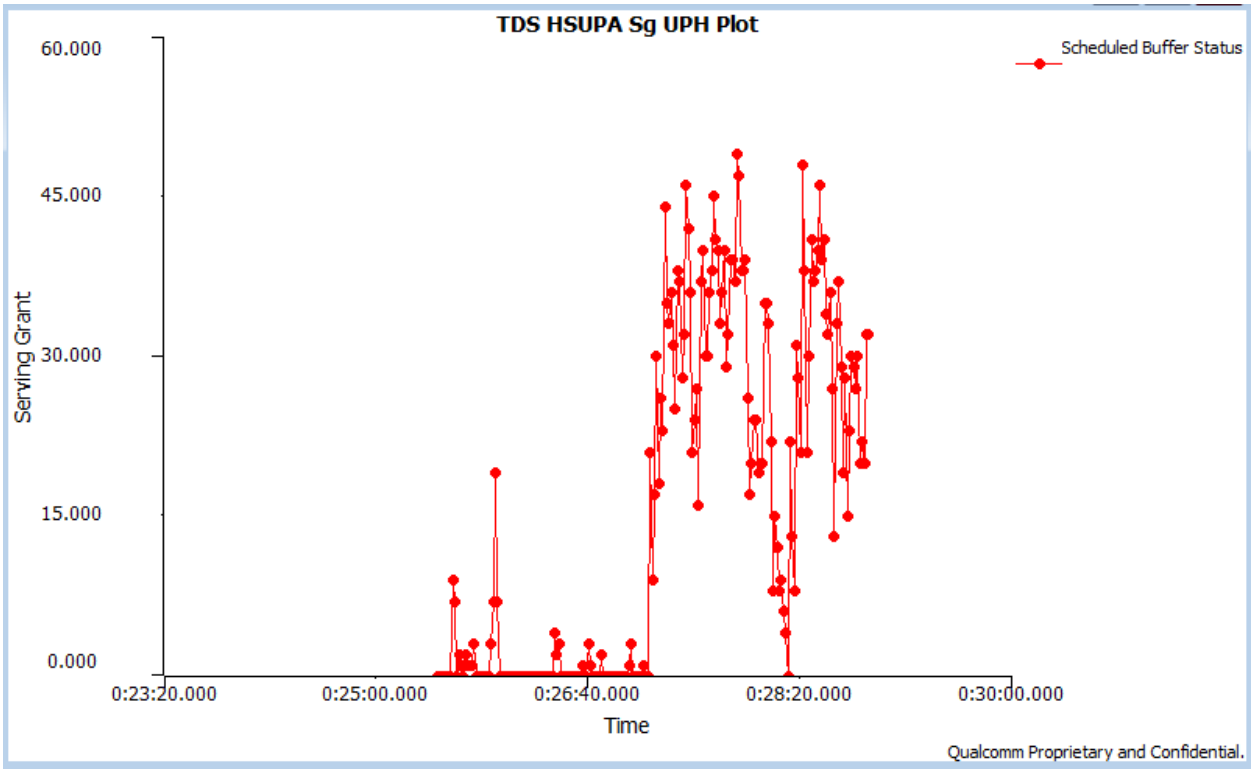

Figure 4-35 TDS HSUPA Sg UPH plot

4.16 TDS HSUPA SNPL vs time

This plot shows the SNPL field from the TD-CDMA L1 UPA statistics info (0xD048) packet. This plots the value of SNPL reported by the UE for obtaining the grant. Higher values of SNPL indicate better uplink channel conditions resulting in better grants performance and helps to identify the reasons behind the network reducing UE grant performance.

Figure 4-36 shows an example TDS HSUPA SNPL vs time grid.

TDS HSUPA SNPL vs. Time
Qualcomm Proprietary and Confidential.

Time	SNPL Measurement
1980/01/06 00:05:51.984	0
1980/01/06 00:05:52.985	0
1980/01/06 00:05:53.985	0
1980/01/06 00:05:54.985	0
1980/01/06 00:05:55.985	0
1980/01/06 00:05:56.985	0
1980/01/06 00:05:57.985	0
1980/01/06 00:05:58.985	0
1980/01/06 00:05:59.985	0
1980/01/06 00:06:00.985	0
1980/01/06 00:06:01.985	0
1980/01/06 00:06:02.985	0
1980/01/06 00:06:03.985	0
1980/01/06 00:06:04.985	0
1980/01/06 00:06:05.984	0
1980/01/06 00:06:06.984	0
1980/01/06 00:06:07.985	0
1980/01/06 00:06:08.985	0
1980/01/06 00:06:09.985	0
1980/01/06 00:06:10.984	0
1980/01/06 00:06:11.985	0
1980/01/06 00:06:12.985	0
1980/01/06 00:06:13.985	0

Figure 4-36 TDS HSUPA SNPL vs time grid

Figure 4-37 shows an example TDS HSUPA SNPL vs time plot.

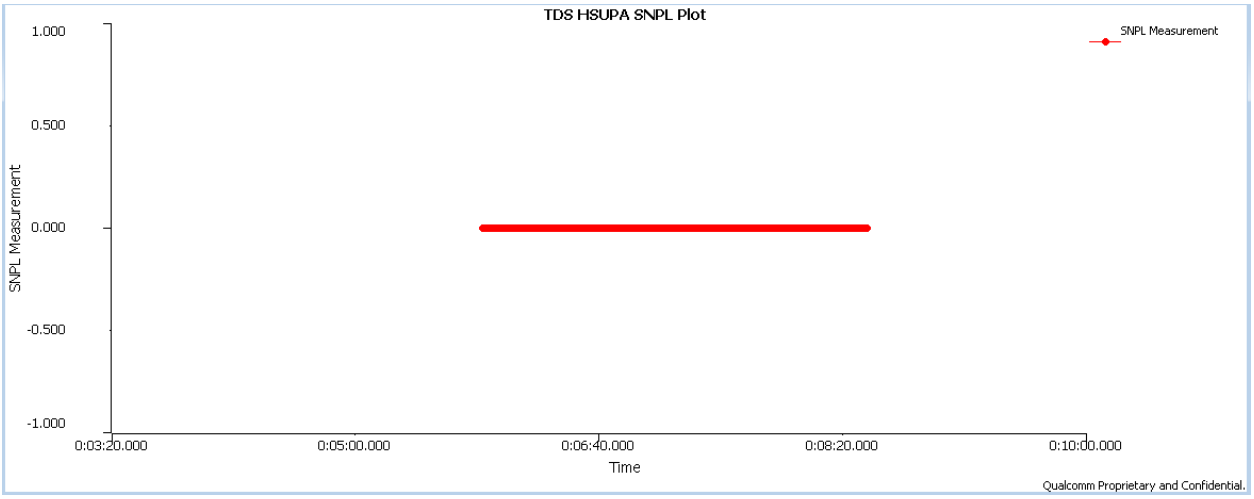

Figure 4-37 TDS HSUPA SNPL vs time plot

4.17 TDS HSUPA UE Bler vs time

This plot shows the total_bler, new_tx_bler and residual_bler fields from the TD-SCDMA L1 UPA statistics info (0xD048) packet. This plot gives the overall BLER during HSUPA transmission, computed from the ACKs/NACKs received in the EHICH channel to help identify if high BLER is affecting the throughput. This plots the overall BLER after taking into account retransmissions and also the BLER taking into account only retransmissions.

Figure 4-38 shows an example TDS HSUPA UE Bler vs time grid.

TDS HSUPA UE Bler vs. Time
Qualcomm Proprietary and Confidential.

Time	Total Bler	New Tx Bler	Residual Bler
1980/01/06 00:06:23.985	4.71	4.71	0.00
1980/01/06 00:06:24.985	9.29	9.29	0.00
1980/01/06 00:06:25.985	4.71	4.71	0.00
1980/01/06 00:06:26.985	2.04	2.04	0.00
1980/01/06 00:06:27.985	5.82	5.82	0.00
1980/01/06 00:06:28.985	3.63	3.63	0.00
1980/01/06 00:06:29.985	4.71	4.71	0.00
1980/01/06 00:06:30.985	4.71	4.71	0.00
1980/01/06 00:06:31.985	5.82	5.82	0.00
1980/01/06 00:06:32.985	5.82	5.82	0.00
1980/01/06 00:06:33.985	7.53	7.53	0.00
1980/01/06 00:06:34.985	4.71	4.71	0.00
1980/01/06 00:06:35.985	3.63	3.63	0.00
1980/01/06 00:06:36.985	4.17	4.17	0.00
1980/01/06 00:06:37.985	7.53	7.53	0.00
1980/01/06 00:06:38.985	4.17	4.17	0.00
1980/01/06 00:06:39.985	2.56	2.56	0.00
1980/01/06 00:06:40.985	7.53	7.53	0.00
1980/01/06 00:06:41.985	5.82	5.82	0.00
1980/01/06 00:06:42.985	3.63	3.63	0.00
1980/01/06 00:06:43.985	3.09	3.09	0.00
1980/01/06 00:06:44.985	5.82	5.82	0.00
1980/01/06 00:06:45.985	6.95	6.95	0.00

Figure 4-38 TDS HSUPA UE Bler vs time grid

Figure 4-39 shows an example TDS HSUPA UE Bler vs time plot.

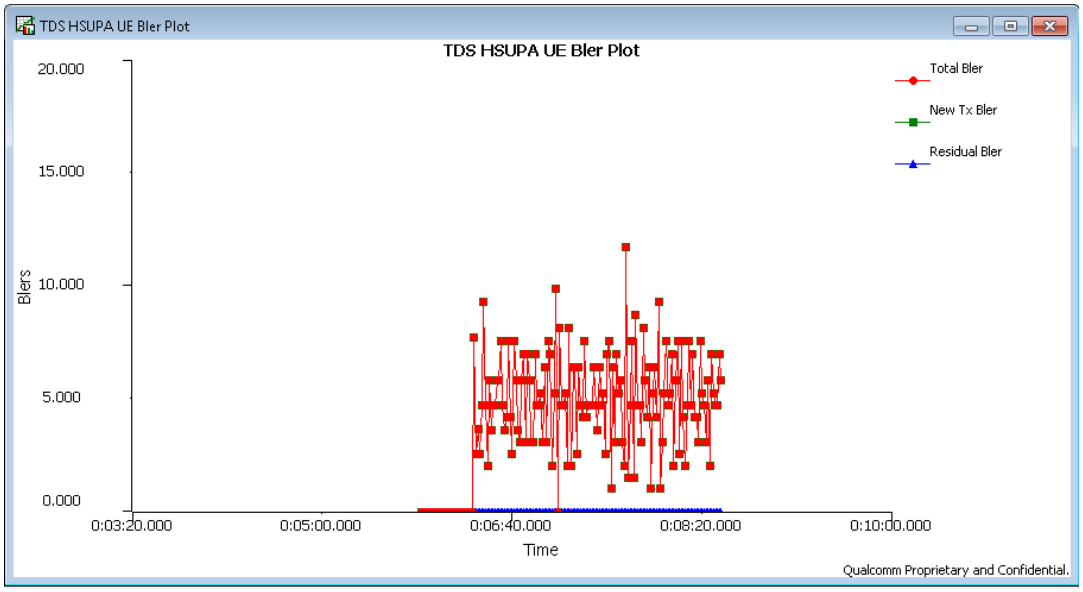

Figure 4-39 TDS HSUPA UE Bler vs time plot

4.18 TDS HSUPA UE schedule vs time

This plot shows the num_sg_avail_sub_frames (number of scheduled serving grants available subframes) field from the TD-SCDMA L1 UPA statistics info (0xD048) packet. This plots shows the number of subframes for which a grant was received. Knowing how often the D048 packet occurs, yon can calculate how many subframes were missing the serving grant.

The output lets you know if network does not allocate grants for transmission, resulting overall lesser throughput. This value should ideally be equal to the IE num_sub_frames.

Figure 4-40 shows an example TDS HSUPA UE schedule vs time grid.

TDS HSUPA UE Schedule vs. Time
Qualcomm Proprietary and Confidential.

Time	Num Sg Avil Sub Frames
1980/01/06 00:05:52.985	21
1980/01/06 00:05:53.985	28
1980/01/06 00:05:54.985	0
1980/01/06 00:05:55.985	22
1980/01/06 00:05:56.985	12
1980/01/06 00:05:57.985	0
1980/01/06 00:05:58.985	8
1980/01/06 00:05:59.985	8
1980/01/06 00:06:00.985	0
1980/01/06 00:06:01.985	8
1980/01/06 00:06:02.985	0
1980/01/06 00:06:03.985	0
1980/01/06 00:06:04.985	8
1980/01/06 00:06:05.984	8
1980/01/06 00:06:06.984	0
1980/01/06 00:06:07.985	4
1980/01/06 00:06:08.985	8
1980/01/06 00:06:09.985	8
1980/01/06 00:06:10.984	8
1980/01/06 00:06:11.985	0
1980/01/06 00:06:12.985	4
1980/01/06 00:06:13.985	4
1980/01/06 00:06:14.985	0
1980/01/06 00:06:15.985	8
1980/01/06 00:06:16.985	12
1980/01/06 00:06:17.985	16
1980/01/06 00:06:18.985	35
1980/01/06 00:06:19.985	70
1980/01/06 00:06:20.985	121
1980/01/06 00:06:21.985	198
1980/01/06 00:06:22.985	200
1980/01/06 00:06:23.985	200
1980/01/06 00:06:24.985	200
1980/01/06 00:06:25.985	200
1980/01/06 00:06:26.985	200
1980/01/06 00:06:27.985	200
1980/01/06 00:06:28.985	200

Figure 4-40 TDS HSUPA UE schedule vs time grid

Figure 4-41 shows an example TDS HSUPA UE schedule vs time plot.

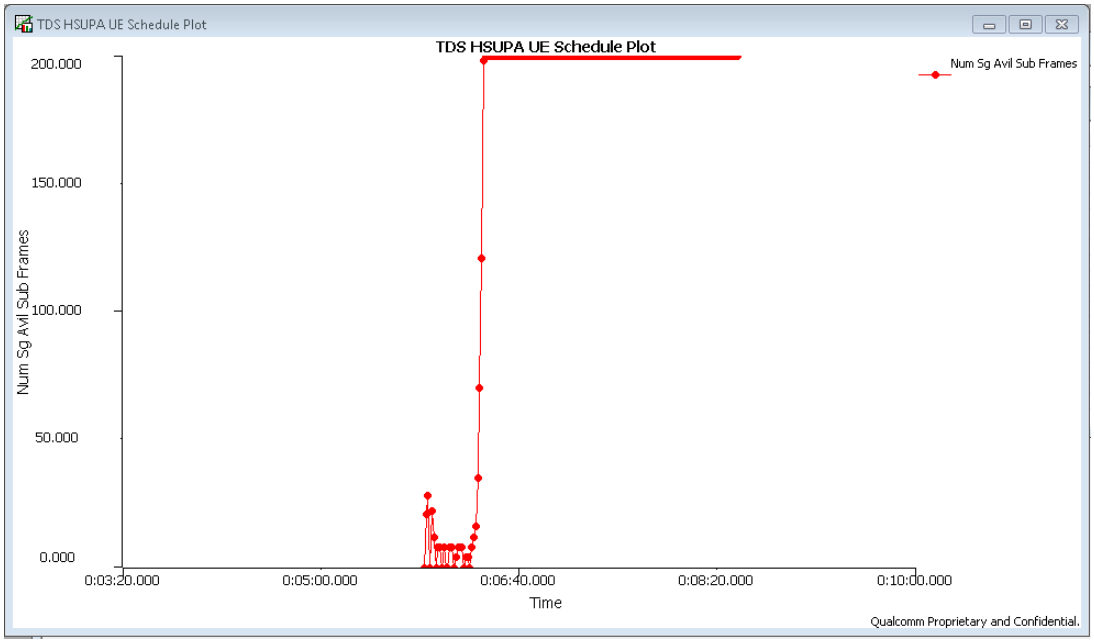

Figure 4-41 TDS HSUPA UE schedule vs time plot

4.19 TDS HSUPA UE Tput vs time

This plot shows the upa_l1_tput, sum_pwr_bits, and sum_sg_bits fields from the TD-SCDMA L1 UPA statistics info (0xD048) packet. This also plot gives the total physical layer throughput and can let you know if the data rate is limited by UE transmit power headroom or insufficient network grants. The analyzer plots the overall L1 throughput and max throughput according to the current power headroom and serving grant allocated by the network.

Figure 4-42 shows an example TDS HSUPA UE Tput vs time grid.

TDS HSUPA UE Tput vs. Time
Qualcomm Proprietary and Confidential.

Time	UPA L1 Tput	Sum Power Bits	Sum Sg Bits
1980/01/06 00:05:51.984	0	0	0
1980/01/06 00:05:52.985	18501	54537	54537
1980/01/06 00:05:53.985	18662	72716	72716
1980/01/06 00:05:54.985	0	0	0
1980/01/06 00:05:55.985	21098	57134	57134
1980/01/06 00:05:56.985	7998	31164	31164
1980/01/06 00:05:57.985	0	0	0
1980/01/06 00:05:58.985	5332	20776	20776
1980/01/06 00:05:59.985	5332	20776	20776
1980/01/06 00:06:00.985	0	0	0
1980/01/06 00:06:01.985	2758	20776	20776
1980/01/06 00:06:02.985	0	0	0
1980/01/06 00:06:03.985	0	0	0
1980/01/06 00:06:04.985	2758	20776	20776
1980/01/06 00:06:05.984	2758	20776	20776
1980/01/06 00:06:06.984	0	0	0
1980/01/06 00:06:07.985	2666	10388	10388
1980/01/06 00:06:08.985	2758	20776	20776
1980/01/06 00:06:09.985	5332	20776	20776
1980/01/06 00:06:10.984	2758	20776	20776
1980/01/06 00:06:11.985	0	0	0
1980/01/06 00:06:12.985	2666	10388	10388
1980/01/06 00:06:13.985	2666	10388	10388
1980/01/06 00:06:14.985	0	0	0
1980/01/06 00:06:15.985	5332	20776	20776
1980/01/06 00:06:16.985	7998	31164	31164
1980/01/06 00:06:17.985	10664	41552	41552
1980/01/06 00:06:18.985	47137	90895	90895
1980/01/06 00:06:19.985	145639	181790	181790
1980/01/06 00:06:20.985	272984	314237	314237
1980/01/06 00:06:21.985	496027	514206	514206
1980/01/06 00:06:22.985	506415	519400	519400
1980/01/06 00:06:23.985	496027	519400	519400
1980/01/06 00:06:24.985	475251	519400	519400

Figure 4-42 TDS HSUPA UE Tput vs time grid

Figure 4-43 shows an example TDS HSUPA UE Tput vs time plot.

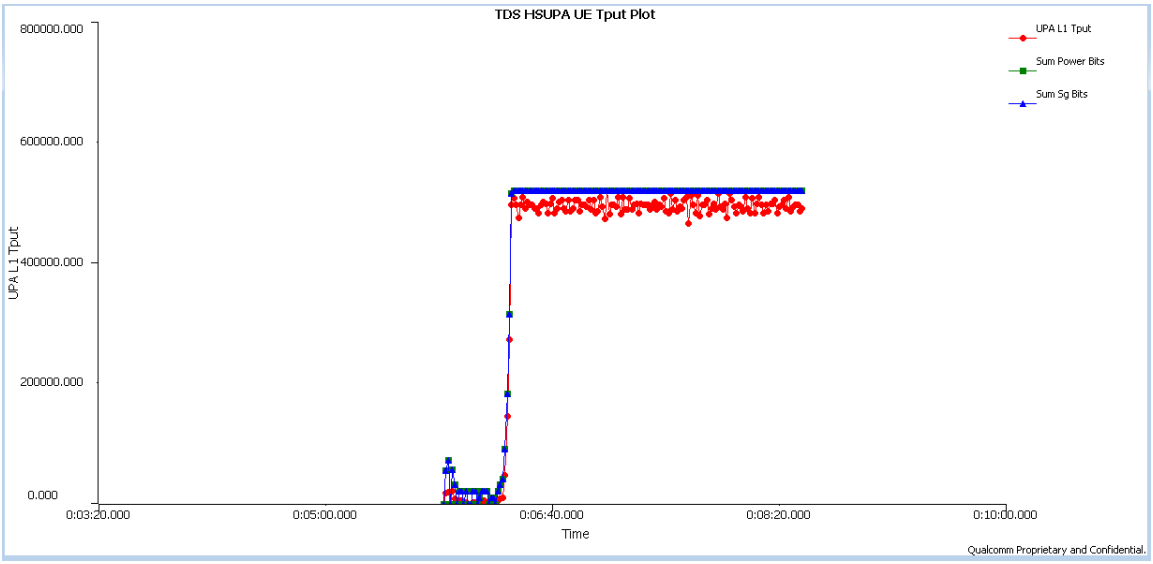

Figure 4-43 TDS HSUPA UE Tput vs time plot

4.20 TDS RSCP ServCell vs time

This plot shows the RSCP of the serving cell and other top 3 cells from the TD-SCDMA measurement accumulated RSCP (0xD00A) packet. To plot the RSCP, use the following equation:

If Cell List Status == ASET

then plot the serving cell's filtRscp and filtRscp for the other top 3 cells

Figure 4-44 shows an example TDS RSCP ServCell vs time grid.

TDS RSCP ServCell vs. Time
Qualcomm Proprietary and Confidential.

Time	Serving Cell	Next Top Cell 1	Next Top Cell 2	Next Top Cell 3
2012/11/27 16:37:54.701	-66	-117	0	0
2012/11/27 16:37:57.905	-66	-117	0	0
2012/11/27 16:38:01.741	-66	-119	0	0
2012/11/27 16:38:04.941	-66	-118	0	0
2012/11/27 16:38:08.781	-66	-118	0	0
2012/11/27 16:38:11.341	-66	-117	0	0
2012/11/27 16:38:14.545	-66	-120	0	0
2012/11/27 16:38:17.741	-66	-119	0	0
2012/11/27 16:38:20.945	-66	-126	0	0
2012/11/27 16:38:24.781	-66	-121	0	0
2012/11/27 16:38:26.701	-66	-120	0	0
2012/11/27 16:38:28.625	-66	-122	0	0
2012/11/27 16:38:28.885	-66	-122	0	0
2012/11/27 16:38:28.985	-66	-122	0	0
2012/11/27 16:38:29.085	-66	-122	0	0
2012/11/27 16:38:29.185	-66	-122	0	0
2012/11/27 16:38:29.285	-66	-117	0	0
2012/11/27 16:38:29.385	-66	-116	0	0
2012/11/27 16:38:29.490	-66	-116	0	0
2012/11/27 16:38:29.610	-66	-116	0	0
2012/11/27 16:38:29.710	-66	-117	0	0
2012/11/27 16:38:29.810	-66	-117	0	0
2012/11/27 16:38:29.910	-66	-117	0	0
2012/11/27 16:38:30.010	-66	-117	0	0
2012/11/27 16:38:30.110	-66	-117	0	0
2012/11/27 16:38:30.210	-66	-117	0	0
2012/11/27 16:38:30.310	-66	-117	0	0

Figure 4-44 TDS RSCP ServCell vs time grid

Figure 4-45 shows an example TDS RSCP ServCell vs time plot.

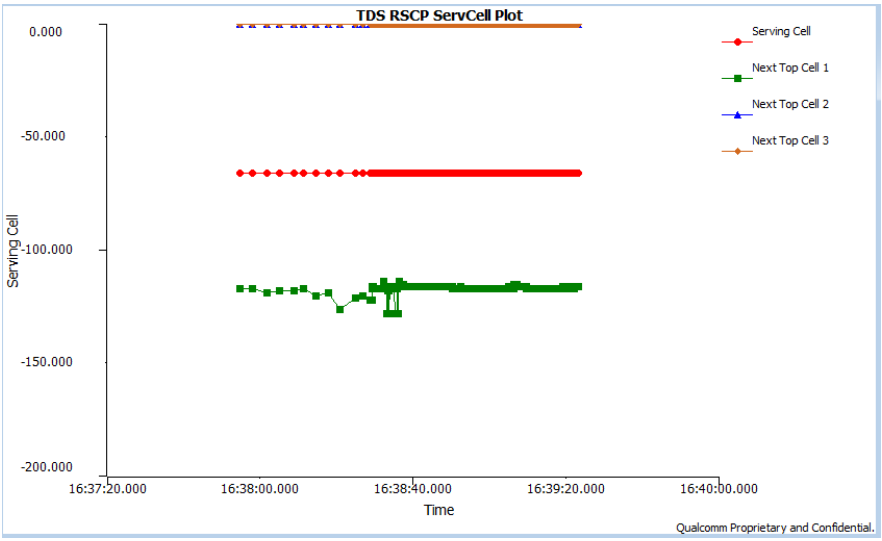

Figure 4-45 TDS RSCP ServCell vs time plot

4.21 TDS RSP ServCell vs time

Data source

- 0xD013 – TD-SCDMA L1 DL DPCH configuration
- 0xD057 – TD-SCDMA accumulate nonTS0 cell table

This plot shows the RSP of the serving cell and other top 3 cells from the TD-SCDMA accumulate nonTS0 cell table (0xD057) packet. To plot the RSP, use the following equation:

If serving cell's cpi != 0 (from 0xD013)

then plot the serving cell's ts_rsp and ts_rsp for the other top 3 cells

Figure 4-46 shows an example TDS RSP ServCell vs time grid.

TDS RSP ServCell vs. Time
Qualcomm Proprietary and Confidential.

Time	Serving Cell	Next Top Cell 1	Next Top Cell 2	Next Top Cell 3
2012/12/13 11:29:28.138	-44	-128	-128	-128
2012/12/13 11:29:29.739	-72	-87	-91	-88
2012/12/13 11:29:38.538	-52	-79	-74	-77
2012/12/13 11:29:40.340	-76	-105	-103	-128
2012/12/13 11:29:54.539	-55	-128	-128	-128

Figure 4-46 TDS RSP SerCell vs time grid

Figure 4-47 shows an example TDS RSP ServCell vs time plot.

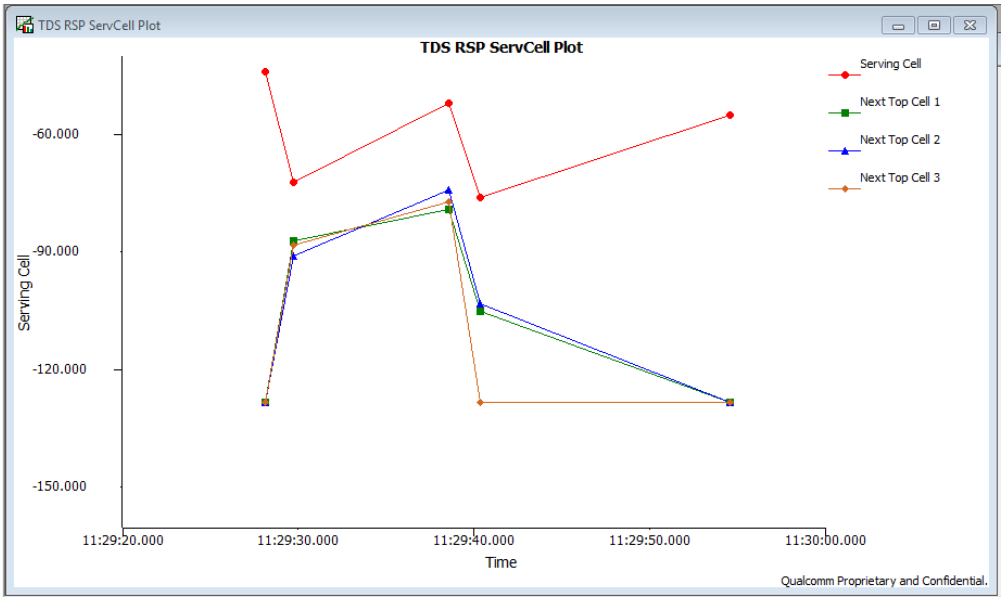

Figure 4-47 TDS RSP ServeCell vs time plot

4.22 TDS TTL loop vs time

This plot shows the coarse and fine TTL values per midIndex from the TD-SCDMA firmware tracking loop results (0xD108) packet. It is useful for tracking the timing error and how efficiently the TTL loop mitigates and minimizes that error.

Fine TTL is defined as the lower 16 bits of stmrTS0Start = 0xB62B34C. In this case, it would be 0xB34C; X = 0xB34C or 45900 in decimal.

Then this is added to TtlResidualAdjust. In this case, it is 27; but this is in Cx45 granularity, so it is converted to Cx8.

Y = 27*(8/45) Cx8.

Fine TTL Value = X + Y = (last 4 numbers of stmrTS0Start) + (TtlResidualAdjust)*(8/45)

Coarse TTL Value = Fine TTL Value + (filteredDwptsTTL)*8,since filteredDwptsTTL is in Cx1.

Granularity is Cx8.

Figure 4-48 shows an example TDS TTL loop vs time grid.

TDS TTL Loop vs. Time
Qualcomm Proprietary and Confidential.

Time	Fine TTL MID Index 12	Coarse TTL MID Index 12
00:00:22.925	14776.7	14776.8
00:00:22.945	14777.4	14777.3
00:00:22.965	14777.8	14777.8
00:00:22.986	14778	14778
00:00:23.006	14778.3	14778.2
00:00:23.026	14778.3	14778.1
00:00:23.046	14778.6	14778.5
00:00:23.066	14778.5	14778.3
00:00:23.086	14778.6	14778.2
00:00:23.106	14778.7	14778.5
00:00:23.128	14778.7	14778.5
00:00:23.148	14778.8	14778.6
00:00:23.169	14778.8	14778.6
00:00:23.189	14778.8	14778.5

Figure 4-48 TDS TTL loop vs time grid

Figure 4-49 shows an example TDS TTL loop vs time plot.

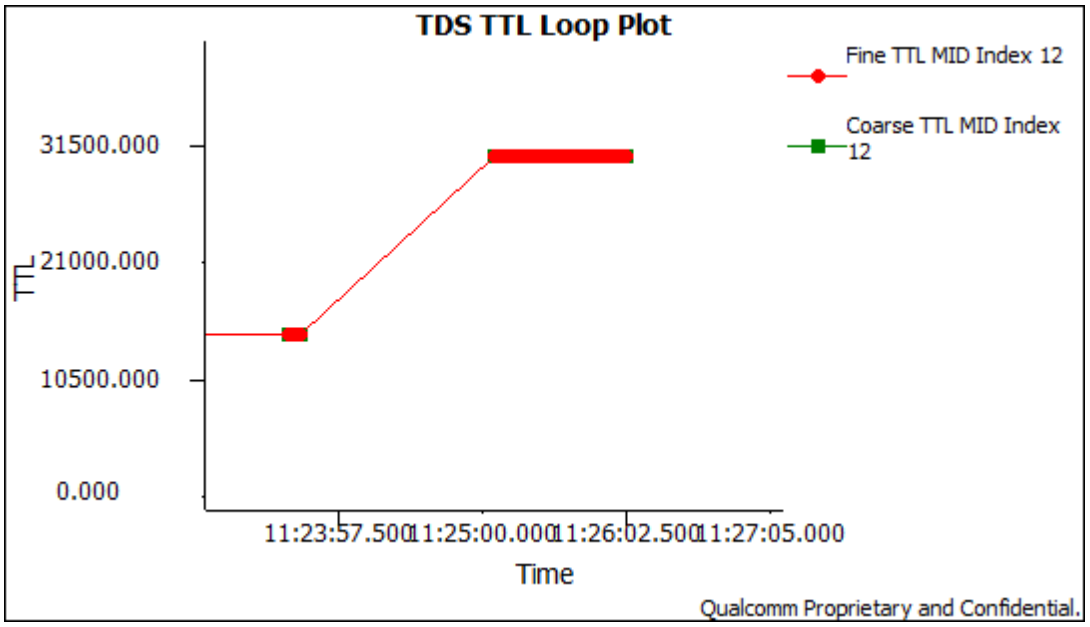

Figure 4-49 TDS TTL loop vs time plot

4.23 TDS UL DPCH TPC vs time

Data source

- 0xD111 – TD-SCDMA firmware TPC SS decoding results
- 0xD11B – TD-SCDMA firmware UL report

This grid shows the actual Tx channel power, MTPL, max power limited, and min power limited from the TD-SCDMA firmware UL report (0xD11B) packet if chanType is equal to DPCH with DL TPC from the TD-SCDMA SS decoding results (0xD111) packet. Figure 4-50 shows an example TDS UL DPCH TPC vs time grid.

TDS UL DPCH TPC vs. Time
Qualcomm Proprietary and Confidential.

Time	Actual TX Channel Power	MTPL	Max Power Limited	Min Power Limited	DL TPC
1980/01/06 01:10:56.445					ERASE
1980/01/06 01:10:56.450					ERASE
1980/01/06 01:10:56.455					ERASE
1980/01/06 01:10:56.460					ERASE
1980/01/06 01:10:56.465					ERASE
1980/01/06 01:10:56.470					ERASE
1980/01/06 01:10:56.475					UP
1980/01/06 01:10:56.478	17.00	22.90	FALSE	FALSE	
1980/01/06 01:10:56.478	17.00	22.90	FALSE	FALSE	
1980/01/06 01:10:56.478	17.00	22.90	FALSE	FALSE	
1980/01/06 01:10:56.478	18.00	22.90	FALSE	FALSE	
1980/01/06 01:10:56.480					ERASE
1980/01/06 01:10:56.485					ERASE
1980/01/06 01:10:56.490					ERASE
1980/01/06 01:10:56.495					ERASE
1980/01/06 01:10:56.495	18.00	22.90	FALSE	FALSE	
1980/01/06 01:10:56.495	18.00	22.90	FALSE	FALSE	
1980/01/06 01:10:56.495	18.00	22.90	FALSE	FALSE	
1980/01/06 01:10:56.500					ERASE
1980/01/06 01:10:56.505					ERASE
1980/01/06 01:10:56.510					ERASE
1980/01/06 01:10:56.513	18.00	22.90	FALSE	FALSE	
1980/01/06 01:10:56.513	18.00	22.90	FALSE	FALSE	
1980/01/06 01:10:56.513	18.00	22.90	FALSE	FALSE	
1980/01/06 01:10:56.514	18.00	22.90	FALSE	FALSE	
1980/01/06 01:10:56.515					ERASE
1980/01/06 01:10:56.520					ERASE
1980/01/06 01:10:56.525					UP
1980/01/06 01:10:56.530					DOWN

Figure 4-50 TDS UL DPCH TPC vs time grid

4.24 TDS UL power control vs time

Data source

- 0xD11B – TD-SCDMA firmware UL report
- 0xD124 – TD-SCDMA firmware HSSCCH decoding results

This grid shows the actual Tx channel power and MTPL from the TD-SCDMA firmware UL report (0xD11B) packet if chanType is equal to HSSICH with DL TPC from the TD-SCDMA firmware HSSCCH decoding results (0xD124) packet. Figure 4-51 shows an example TDS UL power control vs time grid.

TDS UL Power Control vs. Time
Qualcomm Proprietary and Confidential.

Time	Actual TX Channel Power	MTPL	DL TPC
1980/01/06 01:11:50.015			0
1980/01/06 01:11:50.025			0
1980/01/06 01:11:50.030			0
1980/01/06 01:11:50.035			-1
1980/01/06 01:11:50.040			-1
1980/01/06 01:11:50.045			-1
1980/01/06 01:11:50.075			0
1980/01/06 01:11:50.135			1
1980/01/06 01:11:50.145			1
1980/01/06 01:11:50.195			0
1980/01/06 01:11:50.250			-1
1980/01/06 01:11:50.310			0
1980/01/06 01:11:50.390			0
1980/01/06 01:11:50.450			0
1980/01/06 01:11:50.535			0
1980/01/06 01:11:50.560			0
1980/01/06 01:11:50.570			1
1980/01/06 01:11:50.575			0
1980/01/06 01:11:50.630			0
1980/01/06 01:11:50.725			0
1980/01/06 01:11:50.760			-1
1980/01/06 01:11:50.850			0
1980/01/06 01:11:50.855			0
1980/01/06 01:11:50.865			-1

Figure 4-51 TDS UL power control vs time grid

4.25 TDS UL Ts0StartPos vs time

Data source

- 0xD111 – TD-SCDMA firmware TPC SS decoding results
- 0xD11D – TD-SCDMA firmware UL timing

This grid shows the timing advance (ta) and ts0StartPosInUL from the TD-SCDMA firmware UL timing (0xD11D) packet with ss (decoded SS) from the TD-SCDMA firmware TPC SS decoding results (0xD111) packet. Figure 4-52 shows an example TDS UL Ts0StartPos vs time grid.

TDS UL Ts0StartPos vs. Time
Qualcomm Proprietary and Confidential.

Time	Timing Advance	Ts0 Start Position	SS
1980/01/06 01:10:56.051	388	14460	
1980/01/06 01:10:56.073	48	14800	
1980/01/06 01:10:56.073	48	14800	
1980/01/06 01:10:56.445			0
1980/01/06 01:10:56.450			0
1980/01/06 01:10:56.455			0
1980/01/06 01:10:56.460			0
1980/01/06 01:10:56.465			0
1980/01/06 01:10:56.470			0
1980/01/06 01:10:56.475			0
1980/01/06 01:10:56.478	49	14797	
1980/01/06 01:10:56.478	49	14797	
1980/01/06 01:10:56.478	49	14797	
1980/01/06 01:10:56.478	50	14797	
1980/01/06 01:10:56.480			0
1980/01/06 01:10:56.485			0
1980/01/06 01:10:56.490			0
1980/01/06 01:10:56.495			0
1980/01/06 01:10:56.495	50	14797	
1980/01/06 01:10:56.495	50	14797	
1980/01/06 01:10:56.495	49	14797	
1980/01/06 01:10:56.500			0
1980/01/06 01:10:56.505			0
1980/01/06 01:10:56.510			0
1980/01/06 01:10:56.513	49	14797	
1980/01/06 01:10:56.513	49	14797	
1980/01/06 01:10:56.513	49	14797	
1980/01/06 01:10:56.514	50	14797	

Figure 4-52 TDS UL TS0StartPos vs time gird

Figure 4-53 shows an example TDS UL Ts0StartPos vs time plot.

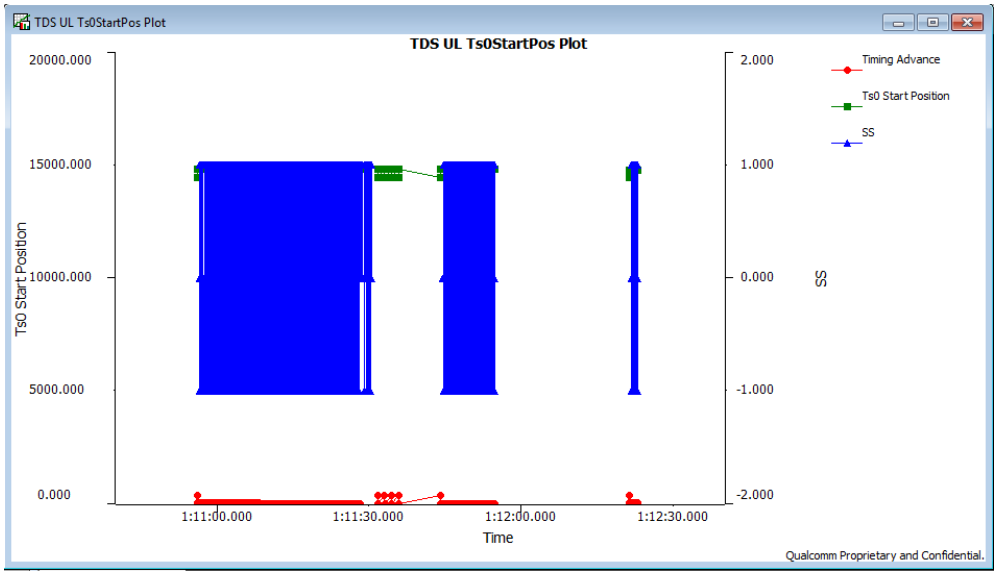

Figure 4-53 TDS UL Ts0StartPos vs time plot

4.26 TDSCDMA UL Tx power vs time

This plot shows the UL Tx power, TS, and channel types from the TD-SCDMA firmware UL report (0xD11B) packet. Figure 4-54 shows an example TDSCDMA UL Tx power vs time grid.

TDSCDMA UL Tx Power vs. Time
Qualcomm Proprietary and Confidential.

Time	Slot	Channel 0	Channel 1	Tx Power
2012/10/12 23:07:27.098	2	3	0	-28.25
2012/10/12 23:07:27.098	1	7	0	-23.81
2012/10/12 23:07:27.098	2	3	0	-29.00
2012/10/12 23:07:27.108	2	3	0	-28.00
2012/10/12 23:07:27.108	2	3	0	-28.00
2012/10/12 23:07:27.118	2	3	0	-29.00
2012/10/12 23:07:27.118	1	7	0	-23.81
2012/10/12 23:07:27.118	2	3	0	-33.19
2012/10/12 23:07:27.128	1	7	0	-23.81
2012/10/12 23:07:27.128	2	3	0	-34.19
2012/10/12 23:07:27.128	2	3	0	-33.19
2012/10/12 23:07:27.138	2	3	0	-32.19
2012/10/12 23:07:27.138	2	3	0	-27.44
2012/10/12 23:07:27.148	2	3	0	-26.44
2012/10/12 23:07:27.148	2	3	0	-27.44
2012/10/12 23:07:27.158	2	3	0	-28.44
2012/10/12 23:07:27.158	1	7	0	-22.81
2012/10/12 23:07:27.158	2	3	0	-31.25
2012/10/12 23:07:27.168	2	3	0	-30.25
2012/10/12 23:07:27.168	2	3	0	-29.25
2012/10/12 23:07:27.178	2	3	0	-30.25
2012/10/12 23:07:27.178	1	7	0	-22.81
2012/10/12 23:07:27.178	2	3	0	-34.25
2012/10/12 23:07:27.188	2	3	0	-33.25

Figure 4-54 TDSCDMA UL Tx power vs time grid

Figure 4-55 shows an example TDSCDMA UL Tx power vs time plot.

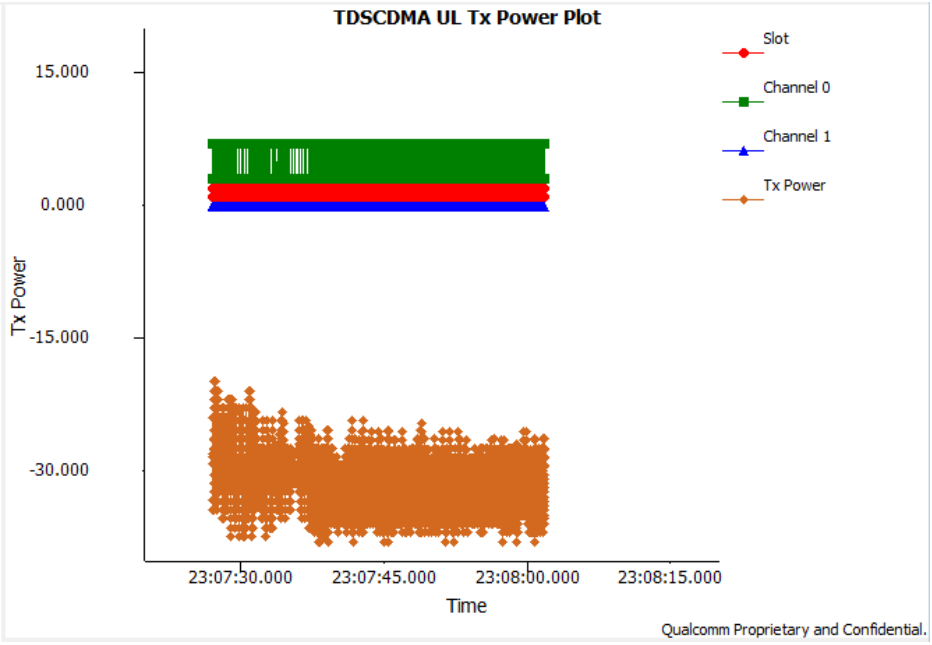

Figure 4-55 TDSCDMA UL Tx power vs time plot