Network Elements affecting Data Speed

Signal strength
Interference
Cell change
Loading

Transport errors

Routing, QoS profiles etc

UE — NodeB — RNC — SGSN — NIB — GGSN

Availability

Operating System
TCP settings
Applications protocols
(FTP, ICMP,HTTP, UDP, RSTP etc)
Speed measurement method

Which site ?

Internet

Routing, delays, congestion, QoS profiles etc
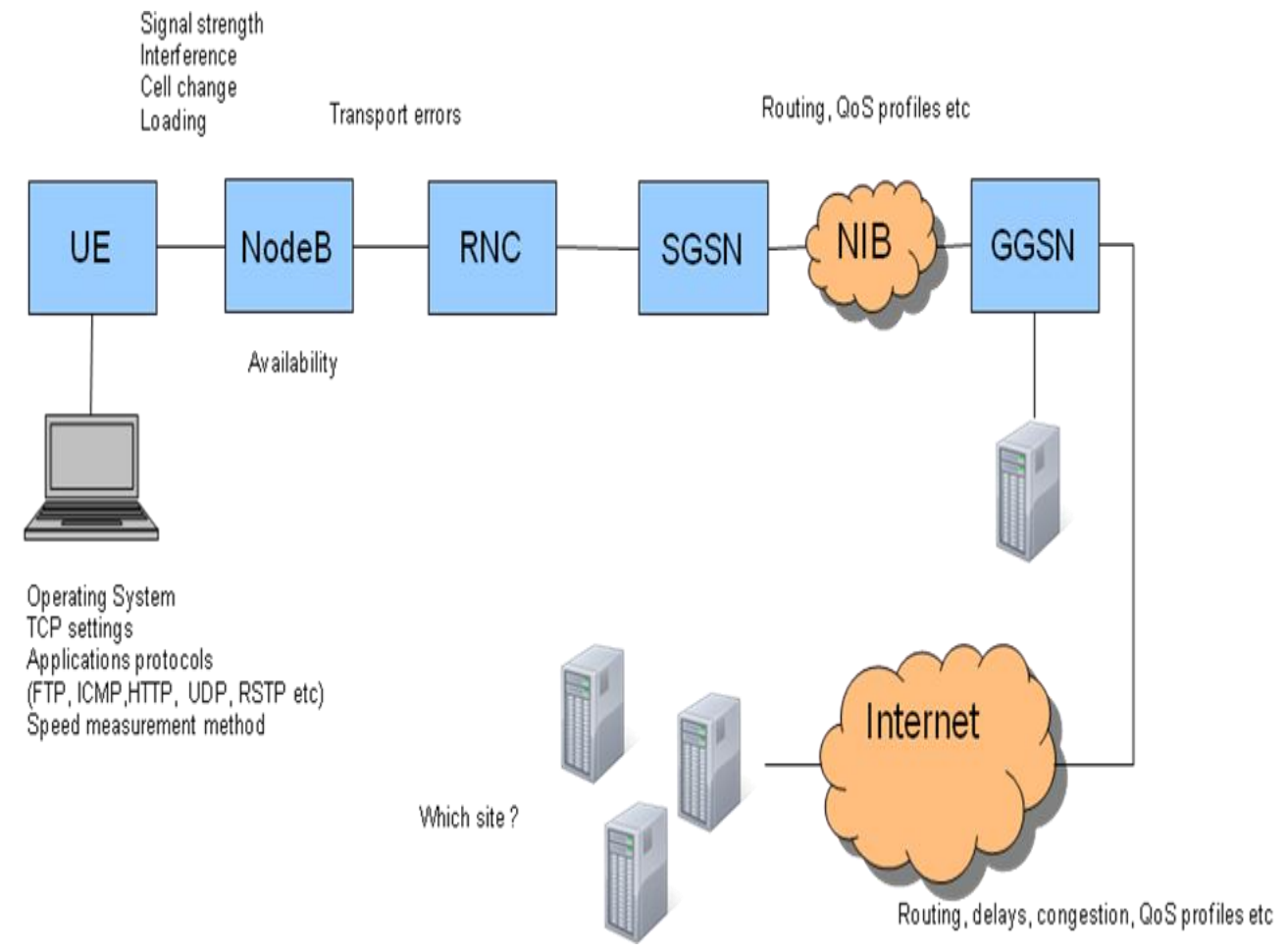
Process to identify possible issues, in case desired speed is not achieved:
1. Check speed through NetPerSec tool
2. Cross-check HSDPA related parameters in RNC & Node B
3. Check SGSN Profile
4. Check HLR Profile (user profile)
5. Check for Time Delay & Jitter using Ping Plotter tool

Procedure to download data through FTP & Speed Estimation

1. Connect to internet using APN httpbsnlstream
2. Disable firewall on your system as it wont allow you to access the server.
3. In run window type cmd and come to command window.
4. type cd\ and then enter which will bring you in c drive(C:\>)
5. Now type ftp 10.147.4.10
6. username-test1 and password-test1
7. type dir (this will show you all files in the server)
8. Type hash and then enter
9. To download any file type: get <filename> and then press enter
10. Download will start,at the end of which you will see the average speed.

14.4 Mbps DOWNLINK DATA SPEED TESTING

PRE REQUISITIES :

› Confirmation of 14.4 Mbps license activation for RNC and Cell site under test

› Site selected should have sufficient backhaul capacity .

› HSPA enabled SIMs and Mobile Handsets / Data Cards with Drive Test Kits.

TOOLS REQUIRED :

- 14.4 Mbps (CAT 10) Data card

- SIM card with User profile defined for 14.4 Mbps HSDPA feature

- Laptop with NetPerSec / Wireshark Data Speed Monitoring Software.

- TEMS Drive Test Kit.

PARAMETER SETTINGS FOR RNC AND NODE B

1 . RNC and NODE B Parameter Settings :

MO Class Name	Parameter Name	Node	Recommended Value	Existing Value	Parameter Description
Hsdsch	numHsPdschCodes	RNC	10	5	Number of codes of SF=16 used for the HS-PDSCH. Disturbances: Changing this attribute may affect ongoing traffic. When the number of codes is incremented, all traffic is released from the cell. When the number is decreased, traffic is not released in the cell, but the Hs-dsch throughput may be affected.
Hsdsch	codeThresholdPdu656	RNC	0	0	Threshold for determining when to use the RLC PDU size = 656 bits for UEs with HS-DSCH physical layer category 7 to 10. Special values:0: always used / 15: never used any other value: - 656 bits are used if codeThresholdPdu656 < numHsPdschCodes, - 336 bits are used if codeThresholdPdu656 >= numHsPdschCodes Unit: code
UtranCell	hsdpaUsersAdm	RNC	1	4	Admission limit for the number of users assigned to the HS-PDSCH/HS-SCCH in the cell. This limit is applicable both to HSDPA RAB setup and to channel switching.Unit: user

MO Class Name	Parameter Name	Node	Parameter Description	New Value	Existing Value in the cell
Carrier	hsPowerMargin	RBS	Power margin the HSDPA scheduler is using when allocating remaining power of cell carrier. It is relative the maximum available power of the cell. Unit: 0.1 dB	1	2
IubDataStreams	maxHsRate	RBS	Maximum HSDPA bit rate over Iub. Unit: 0.1 Mbps	400	400
RbsLocalCell	maxNumHsPdschCodes	RBS	The maximum number of HS-PDSCH codes allowed per cell	15	5
Carrier	cqiAdjustmentOn	RBS	This parameter is used to turn the CQI adjustment of the UE reported CQI on or off per cell.	FALSE	TRUE
NodeBFunction	steeredHsAllocation	RBS	Governs if the use of hsCodeResourceId setting (in MO RbsLocalCell) must be used or not. If set to True, the hsCodeResourceId values must be followed and the HS-DSCH Resources of the cells must be mapped to the specified code resources (HS module on TX board). If set to False, the hsCodeResourceId-settings must be ignored and code resource for the HS-DSCH Resources of the cells must be allocated by the RBS such that load sharing of code resources are maximized. Precondition: No MO HsDschResources must exist	FALSE	FALSE
NodeBFunction	supportOf16qam	RBS	Control of the 16 QAM support in the RBS. True -> the capability of the UE decides whether 16 QAM or QPSK is used False -> 16 QAM support is not set Precondition: To set value true, the license key for HSDPA 16QAM must be activated	TRUE	TRUE
RbsLocalCell	hsIncrementalRedundancyOn	RBS	Controls whether or not HS Incremental Redundancy function is on.	FALSE	FALSE

TEST PROCEDURE :

1. Set up a HSDPA call in the configured cell and start a minimum of three FTP/http download from a server connected to GGSN.

2. If the reported CQI values (min, median and max) doesn't show a value close to 30 move the UE to a position where all the CQI values (min,median and max) reported by TEMS, are as close as possible to 30.

3.Start TEMS Logs and NetPerSec to measure Data Down loading speed.

4. To get maximum DL speed initiate multiple sessions simultaneously (about 8 to 10 sessions-Use of Download manager is recommended.)

5. Once the desired results are achieved , Terminate the download measurements and   save log files.

6. The process to be repeated for FTP as well as   Internet servers.

7. Repeat the same process for other two sectors of Cell site, to check maximum data speed.

8. To check data throughput in all three cells, the same process is to be followed with three simultaneous calls with three Data Testing Kits.

PRACTICAL ACHIEVABLE THROUGHPUT :

Maximum throughput provided (Mbps):	Category 6	Category 8	Category 10	Category 14
#Codes	5	10	15	15
Modulation	16QAM	16QAM	16QAM	64QAM
MAC-hs layer throughput	3.58	6.95	13.8	21.1
Theoretical maximum RLC user data throughput[1]	3.36	6.72	13.4	20.8
RLC user data throughput[2]	2.99	6	12	18.7
Application layer[3]	2.91	5.83	11.7	17.7

The following headers/transmission aspects have been removed before calculating the throughput:
[1] MAC-hs header, padding (only for fixed RLC) and RLC header
2 MAC-hs header, padding (only for fixed RLC), 10% MAC-hs BLER, RLC header and 1% RLC signaling
3 MAC-hs header, padding(only for fixed RLC), 10% MAC-hs BLER, RLC header, 1% RLC signaling, and TCP/IP headers

SAMPLE REPORTS :

SNAPSHOT OF DOWNLINK DATA SPEED USING TEMS & NETPERSEC ON INTERNAL/EXTERNAL SERVERS :