ผลการวัดคุณภาพการให้บริการโทรศัพท์เคลื่อนที่

วันที่ 22 กันยายน พ.ศ. 2556

ส่วนงานกำกับดูแลกิจการโทรคมนาคม

สำนักงานคณะกรรมการกิจการกระจายเสียง

กิจการโทรทัศน์และกิจการโทรคมนาคมแห่งชาติ

Table of Contents

1. TEST METHOD

1.1 Network Technologies Measured

Operators	Technology	Handset
AIS	GSM900/UMTS900/UMTS2100	HTC One V
DTAC	DCS1800/UMTS850/UMTS2100	HTC One V
TRUE-H	DCS1800/UMTS850/UMTS2100	HTC One V
TOT	UMTS2100	HTC One V
MY	UMTS850/UMTS2100	HTC One V

1.2 Call Test Methodology

VOICE CALL TEST MOBILE TO PSTN

➢ TEST METHODOLOGY

    ➢ AUTOMATIC TEST AIS, DTAC, TRUE-H AND TOT

        ➢ TEST COVER HOUR PERIOD 10:20-12:30

➢ CALL SETUP

MOBILE TO PSTN

    ➢ SET UP TIME **28** SEC.

    ➢ CALL TRAFFIC TIME **90** SEC.

    ➢ IDLE TIME **30** SEC.

DATA CALL FTP DOWNLOAD

    ➢ USER EQUIPMENT SETUP ON AUTOMATIC MODE GSM/UMTS

    ➢ SET UP TIME **180** SEC.

    ➢ CALL TRAFFIC TIME **600** SEC.

    ➢ FILE SIZE **5** MB.

Call Setup Success Rate:

Number of the unblocked call attempts divided by the total number of call attempts. Or (1 - Blocking Probability) x 100%

$$CSSR\% = \frac{Number\ of\ Successful\ Call\ Attempt}{Number\ of\ Call\ Attempt} \times 100\%$$

Call Drop Rate:

The Call Drop Rate is the number of dropped calls divided by the total number of call attempts. Or (1 - Call Completion Ratio) x 100%

$$CDR\% = \frac{Number\ of\ Dropped\ Call\ Attempt}{Number\ of\ Call\ Attempt - Number\ of\ Call\ setup\ fail} \times 100\%$$

Data Call IP Accessibility:

The IP-service access ratio denotes the probability that a subscriber can establish a TCP/IP connection to the server of a service successfully.

$$Data\ Call\ IP\ Accessibility\ [\%] = \frac{No.\ of\ Successful\ attempts\ establish\ an\ IP\ connection\ to\ the\ server}{No.\ of\ all\ attempts\ establish\ an\ IP\ connection\ to\ the\ server} \times 100\%$$

Data Call IP Drop Session

$$Data\ Call\ IP\ Drop\ Session\ [\%] = \frac{Number\ of\ Drop\ IP\ session\ call}{Total\ number\ of\ Established\ data\ calls} \times 100$$
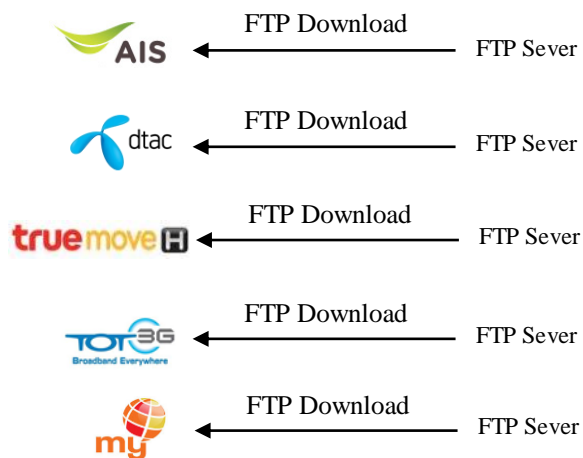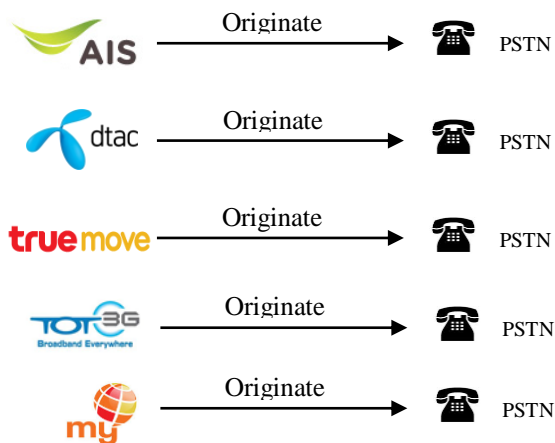
1.3 Test Scenario

Mobile to PSTN

- Make call from Mobiles to PSTN and repeat test by call consequently.

User Equipment Download file from FTP Server

- Make dial-up networking to Mobiles packet network and then download file size 5MB from NBTC FTP server on traffic time schedule.
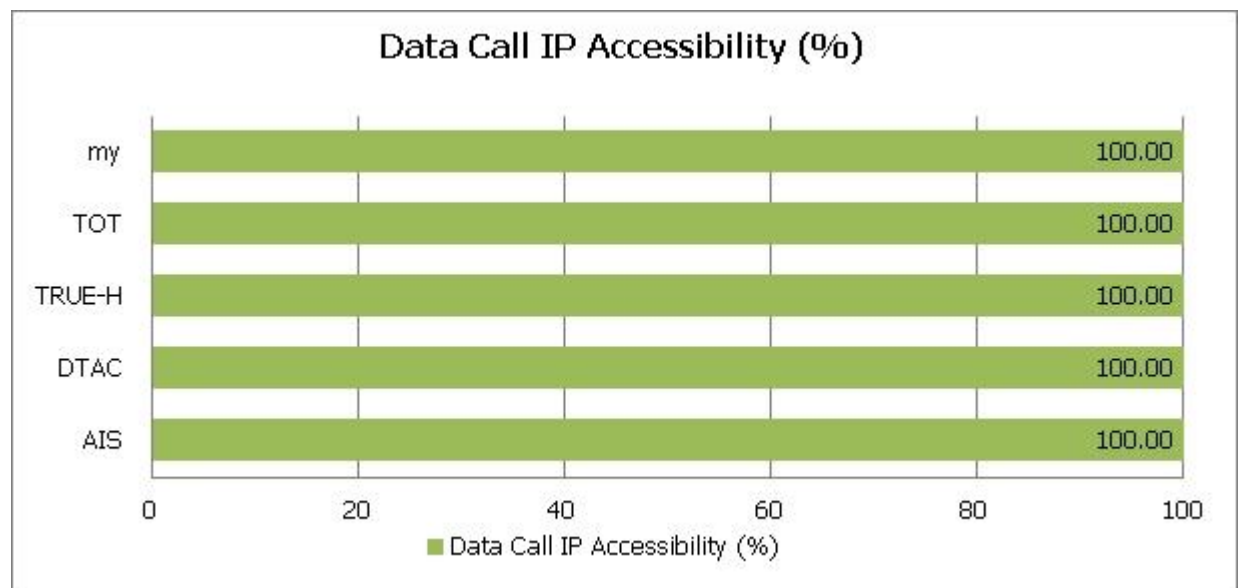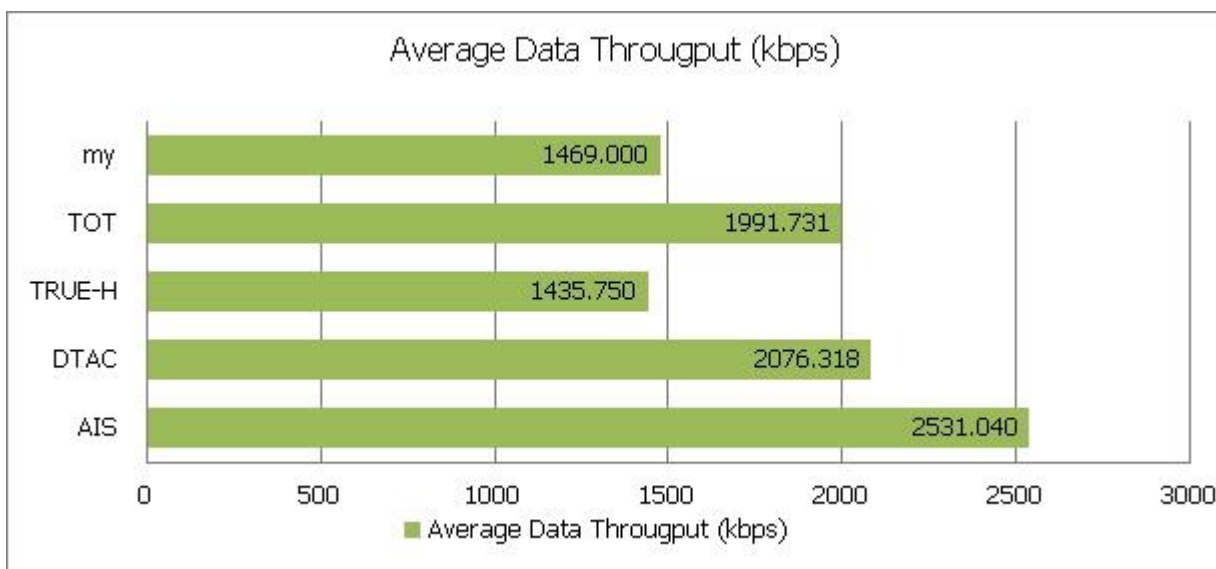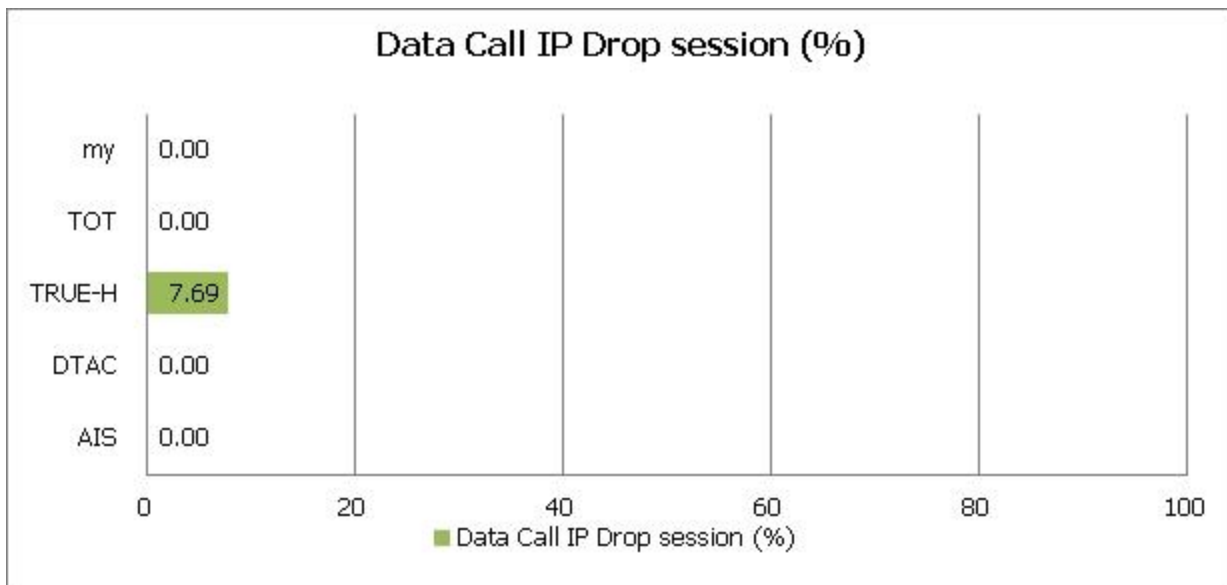
- Repeat test by call consequently.

2. ข้อมูลการทดสอบเชิงสถิติ

ตารางแสดงข้อมูลเชิงสถิติของการทดสอบ **Data service**

Measured parameter	Mobile Network Performance Result				
	AIS	DTAC	TRUE-H	TOT	my
	AIS	dtac	truemove H	TOT 3G Broadband Everywhere	my
Total Data Call Attempt	26	25	26	26	26
Total Data Call Fail	0	0	0	0	0
Total Data Call Dropped	0	0	2	0	0
Data Call IP Accessibility (%)	100	100	100	100	100
Data Call IP Drop session (%)	0	0	7.692	0	0
Data Throughput (Good + Fair)	100	100	100	100	100
Average Data Throughput (kbps)	2531.04	2076.318	1435.75	1991.731	1469

Data Call IP Drop session (%)

ผู้ให้บริการ	ค่า
my	0.00
TOT	0.00
TRUE-H	7.69
DTAC	0.00
AIS	0.00

Average Data Througput (kbps)

ผู้ให้บริการ	ค่า
my	1469.000
TOT	1991.731
TRUE-H	1435.750
DTAC	2076.318
AIS	2531.040

ตารางแสดงข้อมูลเชิงสถิติของการทดสอบ **Voice call**

Measured parameter	Mobile Network Performance Result				
	AIS	DTAC	TRUE-H	TOT	my
	AIS	dtac	truemove H	TOT3G Broadband Everywhere	my
Call Attempts (Calls)	26	25	26	26	26
Call Origination Failure (Calls)	0	1	0	0	2
Call Dropped (Calls)	0	1	0	0	1
Good Call	26	23	26	26	23
Call Complete Rate (CCR (%))	100	92	100	100	88.462
Drop Call Rate (DCR (%))	0	4	0	0	3.846
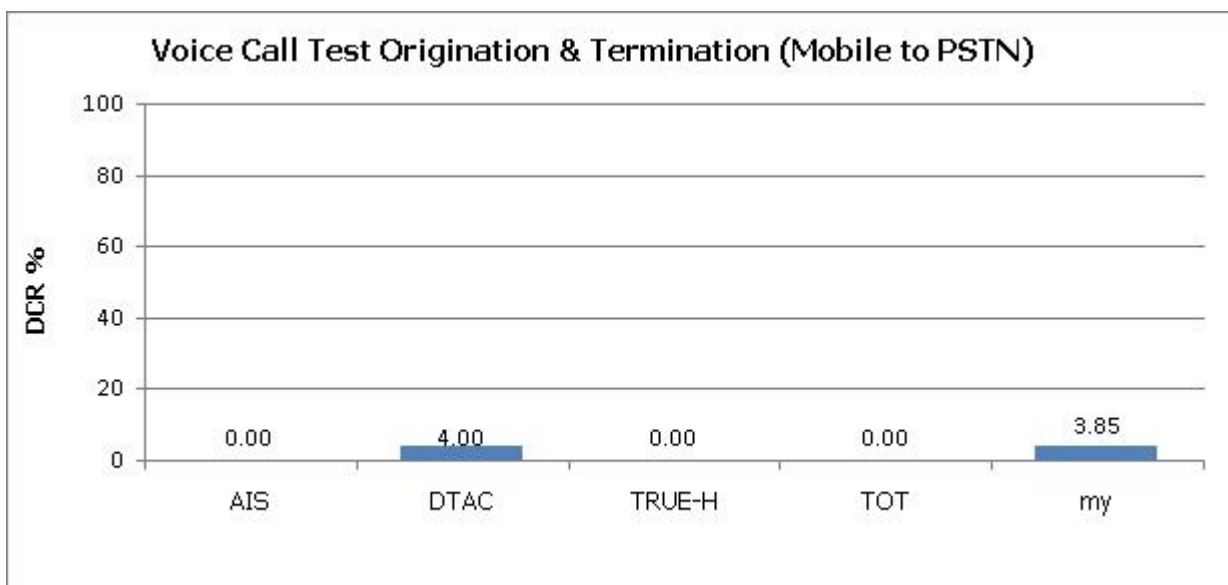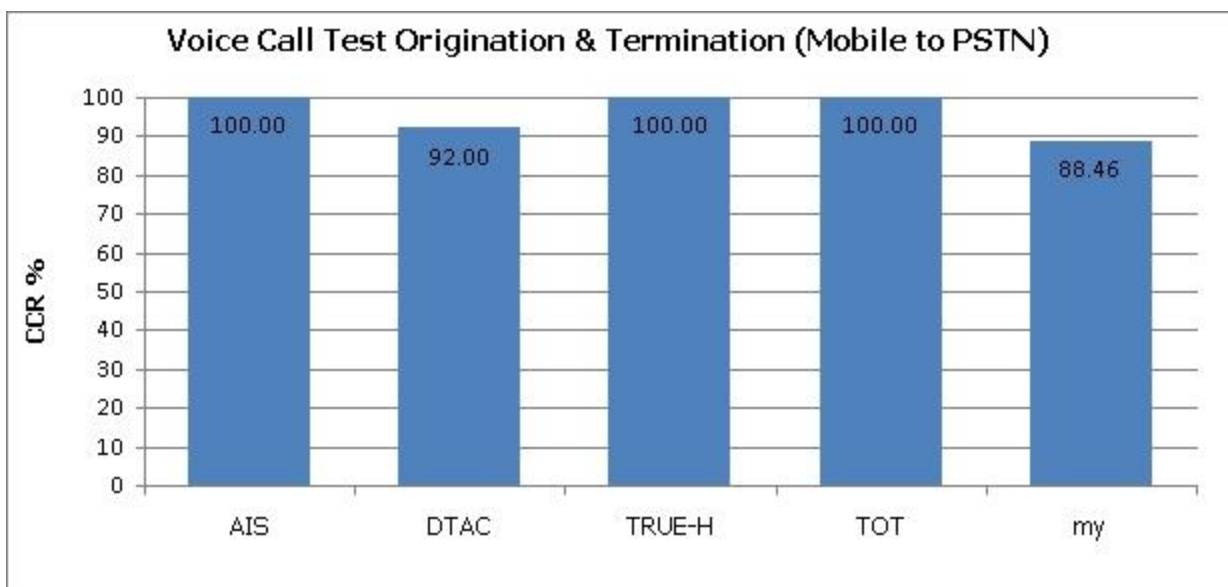
AIS 2G+3G Maps
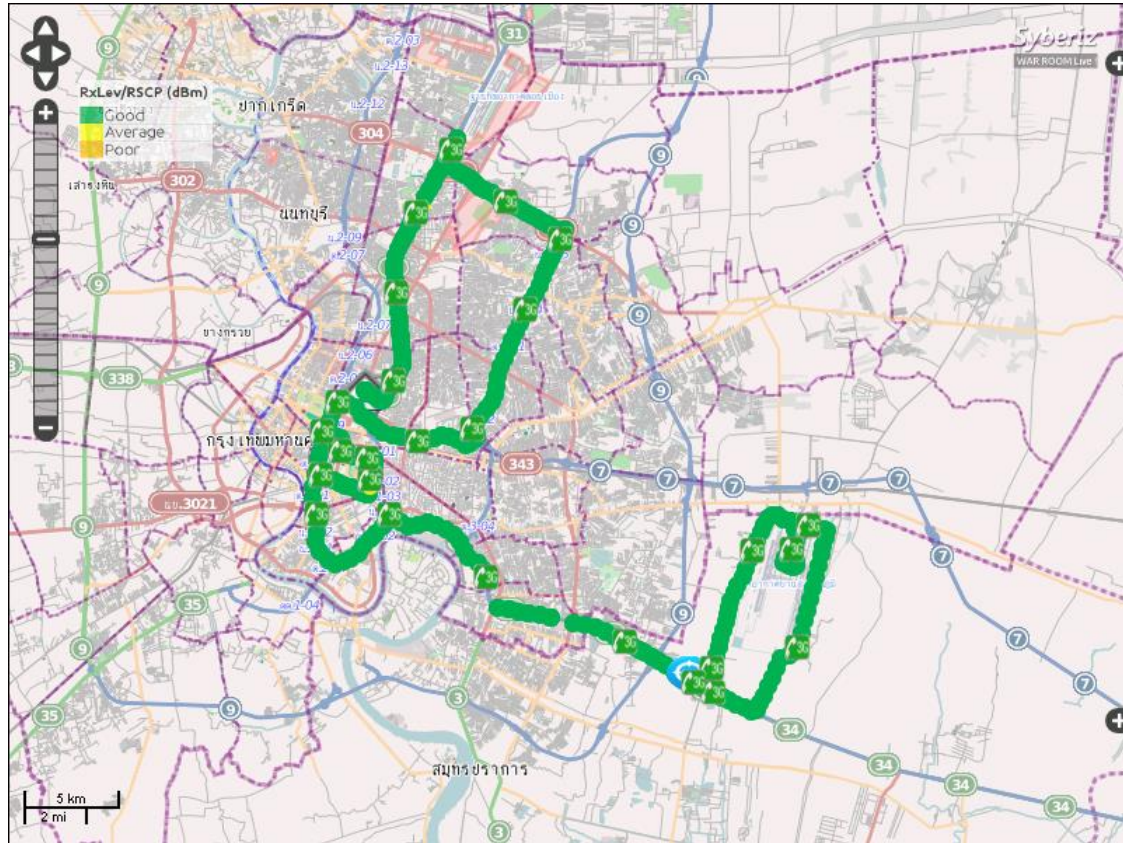
DTAC 2G+3G Maps

TRUE-H 2G+3G Maps
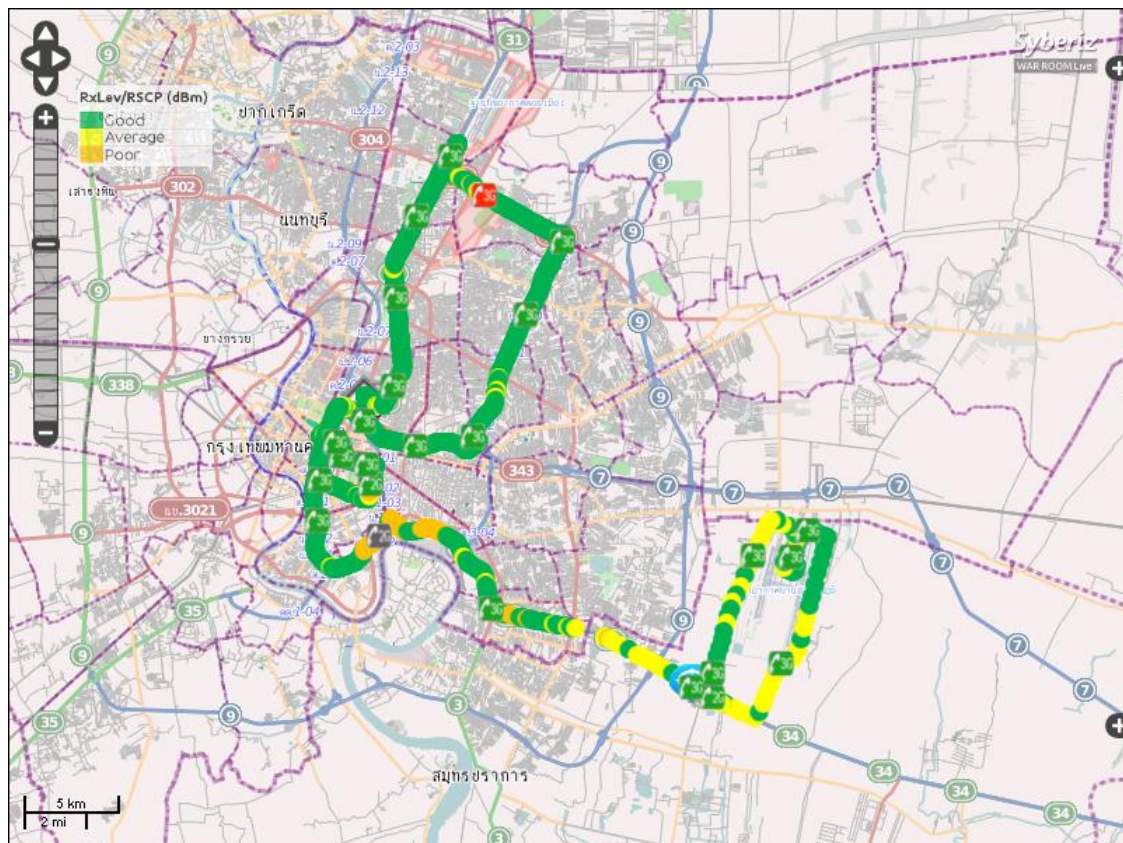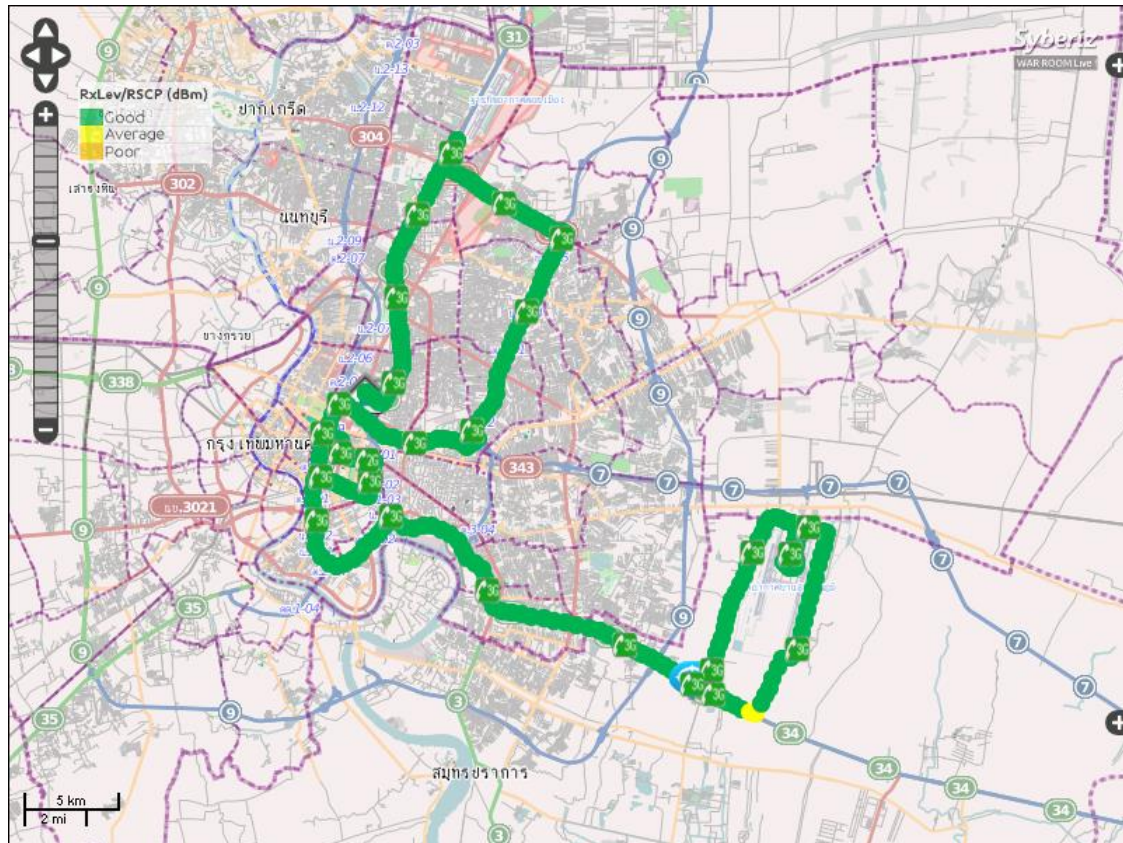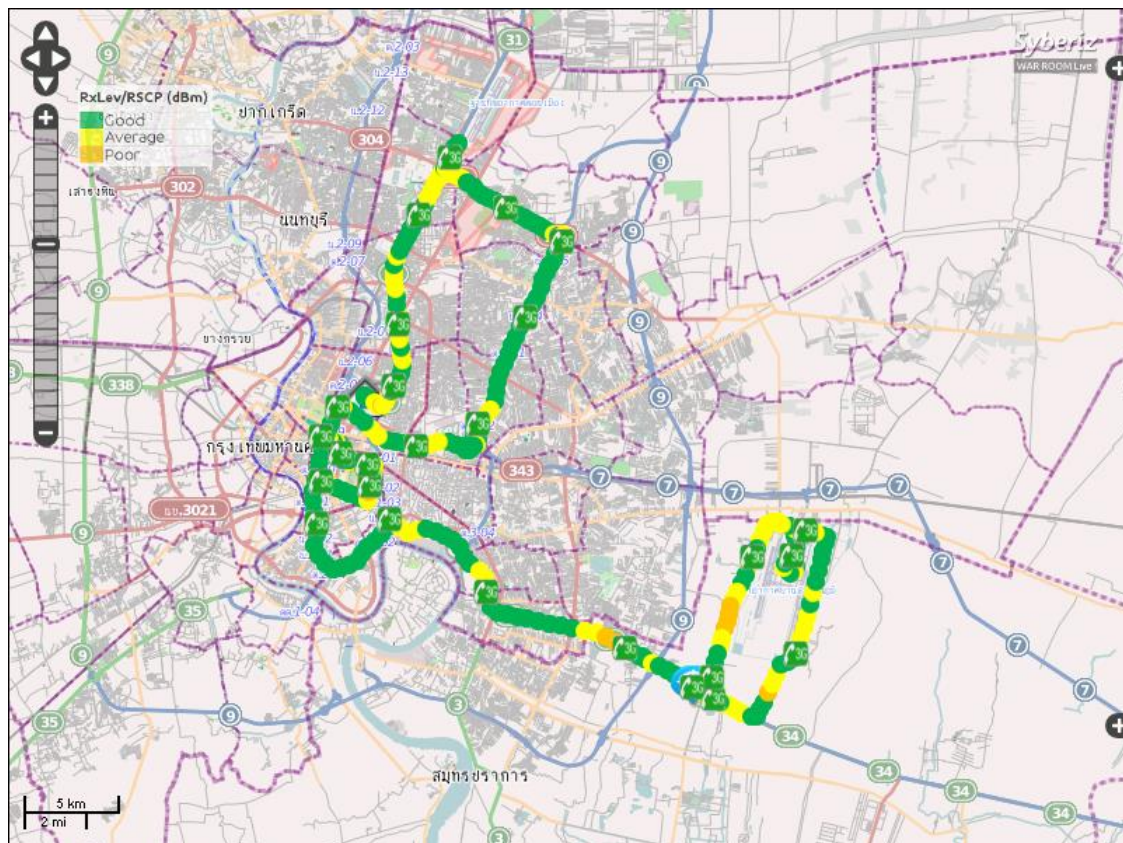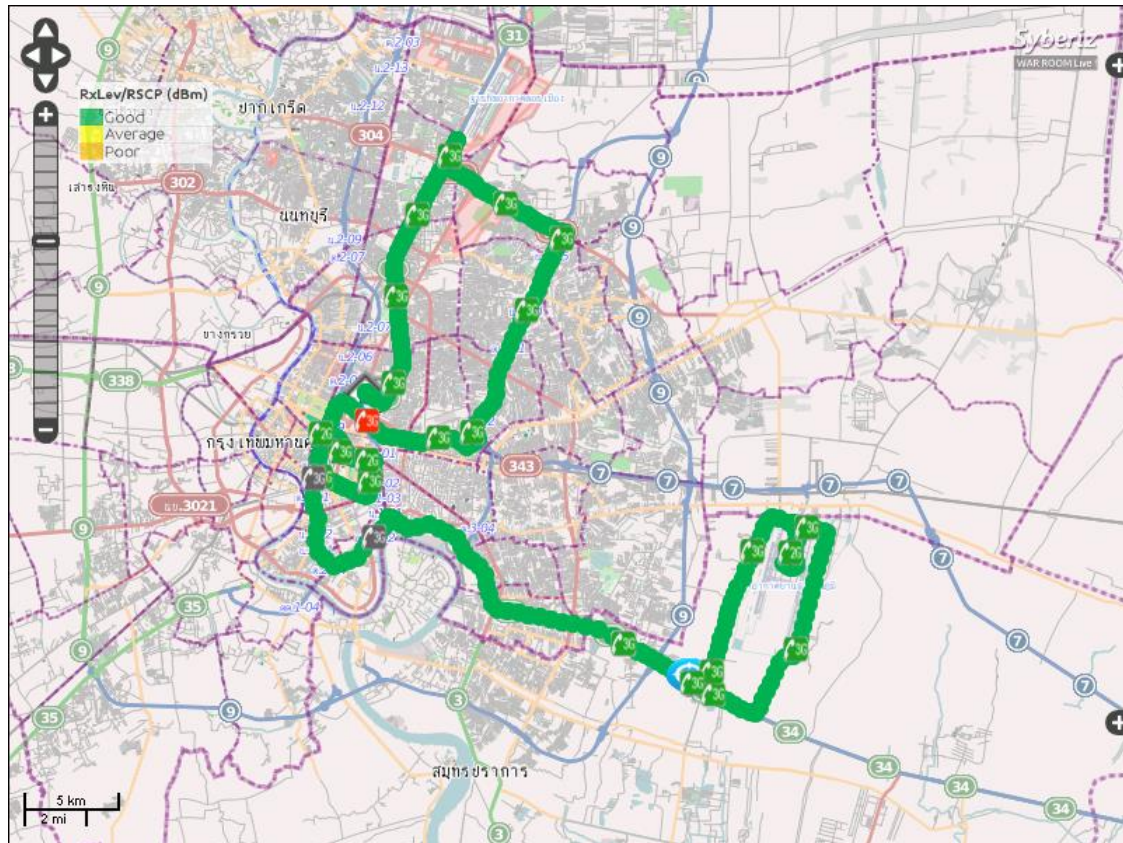

TOT3G 2G+3G Maps

my 2G+3G Maps

4. GLOSSARY

Call Completion Rate:

The ratio of successfully completed calls to the total number of attempted calls (ITU-TE600/2.13).That is, the ratio of the number of completed call attempts to the total number of call attempts, at a given point of a network.

Note: This ratio is typically expressed as either a percentage or a decimal fraction. It is the number of calls of specific duration successfully completed; measured per100 calls.

Note: A complete call is a call that is released by normal call clearing (i.e., Released Message "RL_M" and Released Complete Message "RLC_M" has been successfully exchanged in the signaling flow), be it during a ringing phase or conversation phase by either the caller or called party.

Call Setup Success Rate:

Number of the unblocked call attempts divided by the total number of call attempts. Or
(1 - Blocking Probability) x 100%

Note: A call setup is an exchange of signaling information in the call process that leads to Traffic Channel (TCH) seizure.

Call Drop Rate:

The Call Drop Rate is the number of dropped calls divided by the total number of call attempts. Or(1 - Call Completion Ratio) x 100%

Note: A dropped call is a call that is prematurely terminated before being released normally by either the caller or called party (i.e., the call is dropped before the exchange of Released Message "RL_M" and Released Complete Message "RLC_M" in the signaling flow).

Data Call IP Accessibility:

The IP-service access ratio denotes the probability that a subscriber can establish a TCP/IP connection to the server of a service successfully.

Data Call IP Accessibility [%] = $\dfrac{\text{No of Successful attempts establish an IP connection to the server}}{\text{No. of all attempts establish an IP connection to the server}}$ X 100%

Data Call IP Drop Session

Data Call IP Drop Session [%] = $\dfrac{\text{(number of Drop IP session call)}}{\text{(Total number of Established data calls)}}$ X 100

FTP Download Test:

FTP applications could be used for estimating uplink/downlink throughput performance, the old FTP having the advantage of avoiding measurement errors from file compression, cache, etc. Different payloads should be considered for quantifying the operation of the resource location algorithms. Throughput is used as a measure of speed quality. In addition, the success of the FTP sessions measures the reliability of the network as experienced by users. FTP sessions require two communication ports. Usually, port 21 is used by the protocol interpreter (PI), while port 20 is used by the data transfer protocol (DTP). Port 21 sets up the data link (port 20) for performing the actual file transfer and closes the FTP session.
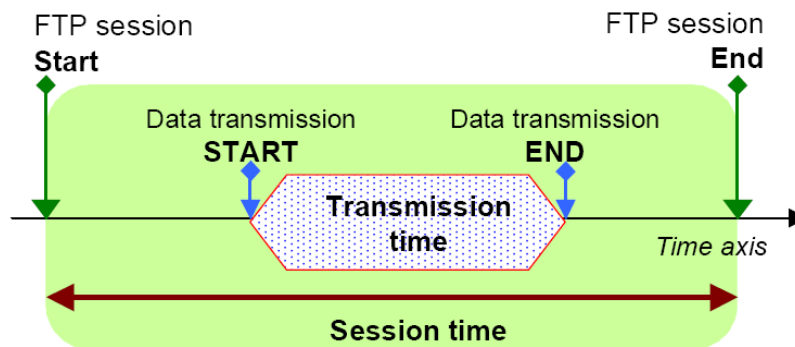
Based on the reference time used (1), one may derive FTP session and transmission throughput. The first one has significance for users while the second one gives indications on the network performance and may be used for directing the optimization process.

$$\text{Throughput [kb/s]} = \frac{\text{Payload [kbit] (1)}}{\text{Reference time [sec]}} \qquad (1)$$

Originate Call:

A call outbound or originating from a mobile device

Terminate Call:

A call inbound or terminated to a mobile device.

Setup Time:

The call setup time is the time from a send button is pressed or when the address information required for setting up a call is received by the network to when the called party busy tone or ringing tone or answer signal is received by the calling party.

Traffic Time:

Time after completed setup call that enter into traffic state until call to terminate

Idle Time:

Time after the call is released from network until the new call is attempted

RSCP:

Received Signal Code Power of CPICH channel with PSC.

EC/Io:

The ratio in dB between the pilot energy accumulated over one PN chip period (Ec) to the total power spectral density (I0) in the received bandwidth.

Call Classifications

Voice Call

ORIG FAILED - If the Mobile is denied access to the system then the call is classified as a failed call. A failed call attempt has no voice channel assigned within the call setup interval (typically 20-28 seconds). This includes calls being disconnected at the PSTN.

TERM FAILED - An incoming call for a mobile subscriber is called a mobile terminated call. If the Mobile is cannot receive the incoming call on the system then the call is classified as a failed call. A failed call attempt has no paging response from network and no alerting within the call setup interval (typically 28 seconds).

DROPPED - If the call ends prematurely after a voice channel has been assigned, the call is classified as a dropped call.

COMPLETED - If the call ends correctly at the end of the specified call the call is classified as a completed call.

Data Call

FAILED - Phase of service usage not reached. Successful or failed service access may be broken down into diagnostic sub-categories. The general name-forming rule is: <name of sub-phase>result. Example: Network access failure; IP service access success.

COMPLETED - Data-transfer transactions: All content intended to be transferred has been successfully transferred. Conversational transactions: The intended transaction duration has been reached.

INCOMPLETE - Data-transfer transactions: All content intended to be transferred has been unsuccessfully transferred within duration setup.

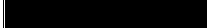**DROPPED** - Service usage was ended before completion.

PENDING - If the throughput becomes and keeps lower than specified threshold
Throughput below 10 kbps within time duration 10 sec.
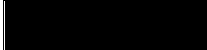
การวัดระดับความแรงสัญญาณ (RF Receive signal strength)

Coverage		Receive signal strength (dBm)	
		GSM	WCDMA
🟩	Strong	RxLev > -80	RSCP > -80
🟨	Moderate	-85 > RxLev > -80	-90 > RSCP > -80
🟥	Weak	RxLev < -85	RSCP < -90

การวัดระดับคุณภาพสัญญาณ (RF Signal Quality)

Level of Signal Quality		Signal Quality	
		GSM	WCDMA
🟩	Good	RxQual 0,1,2	Ec/Io 0 to -9
🟨	Fair	RxQual 3,4	Ec/Io -9 to -12
🟥	Poor	RxQual 5,6	Ec/Io -12 to -14
⬛	Bad	RxQual 7	Ec/Io Below -14

การวัดระดับการรับข้อมูลแบบ FTP Download (FTP Throughput)

FTP Rx Throughput		FTP Rx Inst. Throughput (kbps)
🟦	Excellent	FTP Rx $\geq$ 2000
🟩	Good	384 $\leq$ FTP Rx < 2000
🟨	Fair	128 $\leq$ FTP Rx < 384
🟥	Poor	64 $\leq$ FTP Rx < 128
⬛	Bad	FTP Rx < 64