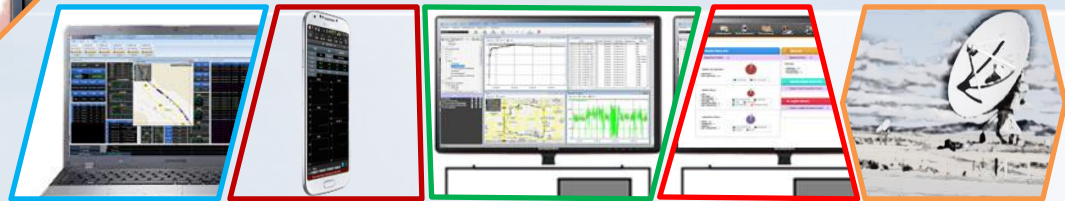


SOLUTELIA

아
시
아

WIND™

Wireless Intelligence on Demand



SoluteliaAsia Co., Ltd.

基地局環境及び端末との送受信状態を目視で確認・収集・分析できる
移動通信ネットワークの最適化 SYSTEM



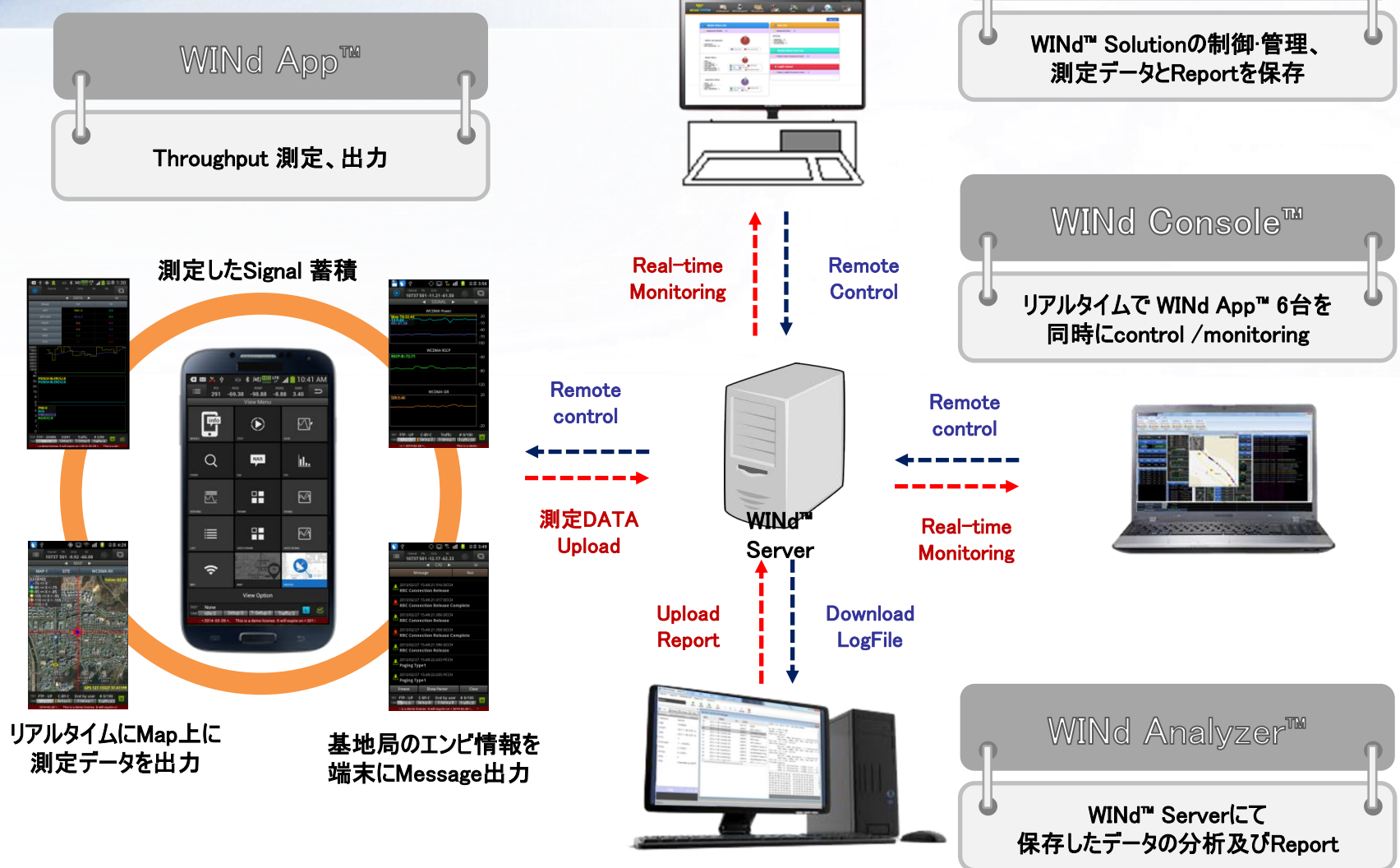
電波環境
収集・分析

目標と実際の
品質比較
が可能

電波不良/
陰影地域の
最適化

基地局増
設及び移転
など

システム構成



移動通信ネットワークの最適化のための RF ENGINEERING TOOL



- Appで具現
- Android OS基盤
SMART Phone/
Tablet PCにインス
トール

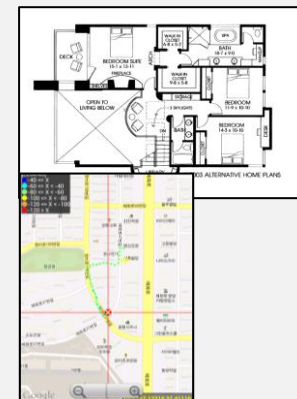


携帯が簡単
使用しやすい



Voice Call
FTP
PING
HTTP

多様なAuto Call Test
可能



- 室内無線環境測定
が可能
- Google Mapを通じ
てリアルタイム
Mapping

端末の機能及び測定項目

MOBILE INFORMATION

SKT LTE Voice 1:36	
Channel PN Ec/Io RX SIR	
MOBILE	
Mobile MIN	01038535387
Mobile IMEI	356432057376779
Mobile IP	10.221.251.225
Server Connect	DISCONNECTED
Server Upload	0 Byte
Server Download	0 Byte
External Memory	CONNECT
Free Space	0.00 KB
Logging File	
Logging Size	0 Byte
Lat / Lon	
TEST TIME	None Idle:0 Setup:0 T-Setup:0 Traffic:0
2014-03-09 >... This is a demo license. It will expire on < 2014-03-09 >...	

画面表示詳細

Mobile MIN	Mobile Identification Number
Mobile IMEI	International Mobile Equipment Identity
Mobile IP	Local Mobile IP Address
Server Connect	Serverとの連結状態
Server Upload	単位 : Byte
Server Download	単位 : Byte
External Memory	Connection state check
Free Space	Memory information
Logging File	Logging Fileの生成及び保存
Logging Size	Logging file size
Lat/Lon	Latitude / Longitude

TEST 進行過程出力

画面表示詳細



Test	Auto call test Type
Call Type	Origination or continuous
Total#	発生 call / 設定call (%)
Success#	成功 call / 発生 call (%)
S_Fail#	Setup failed call / 発生 call (%)
T_Fail#	T_Fail call/ 発生 call (%)
Drop#	Drop call / 発生 call (%)
ETC #	ETC call / 発生 call (%)
Idle	Idle Time (sec)
Setup	Setup Time (sec)
T_Setup	Data call traffic setup time (sec)
Traffic	Voice (or Data) call traffic time (sec)

DATA

Layer別 Throughputを表示



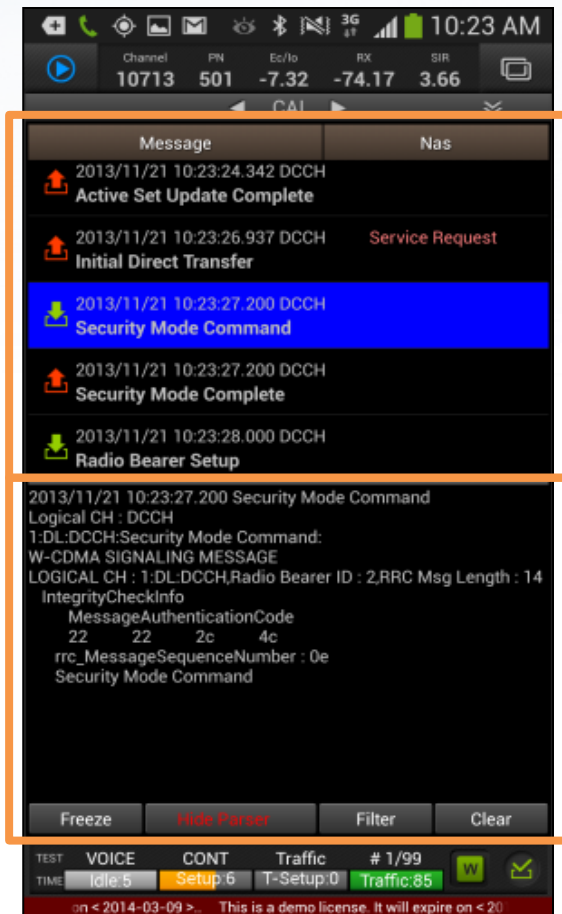
Throughputを
値と
Graphで表示

BLER(%)と
PMI, RI 値を
Graphで表示

画面表示詳細

Rx	Download
Tx	Upload
APP	Application Layer
APP AVR	APP Average
PDCP	Packet Data Convergence Protocol
RLC	Radio Link Control Layer
MAC	Medium Access Control Layer
PHY	Physical Layer
PDSCH BLER / PUSCH BLER	Physical Downlink (Uplink) Shared Channel Block Error Rate
PMI	Pre-coding Matrix Indicator
RI	Rank Indicator

CAI (Common Air Interface message)



➡ 基地局(eNB)と端末(UE)の通信した
CAI Messageをリアルタイムで画面に表示

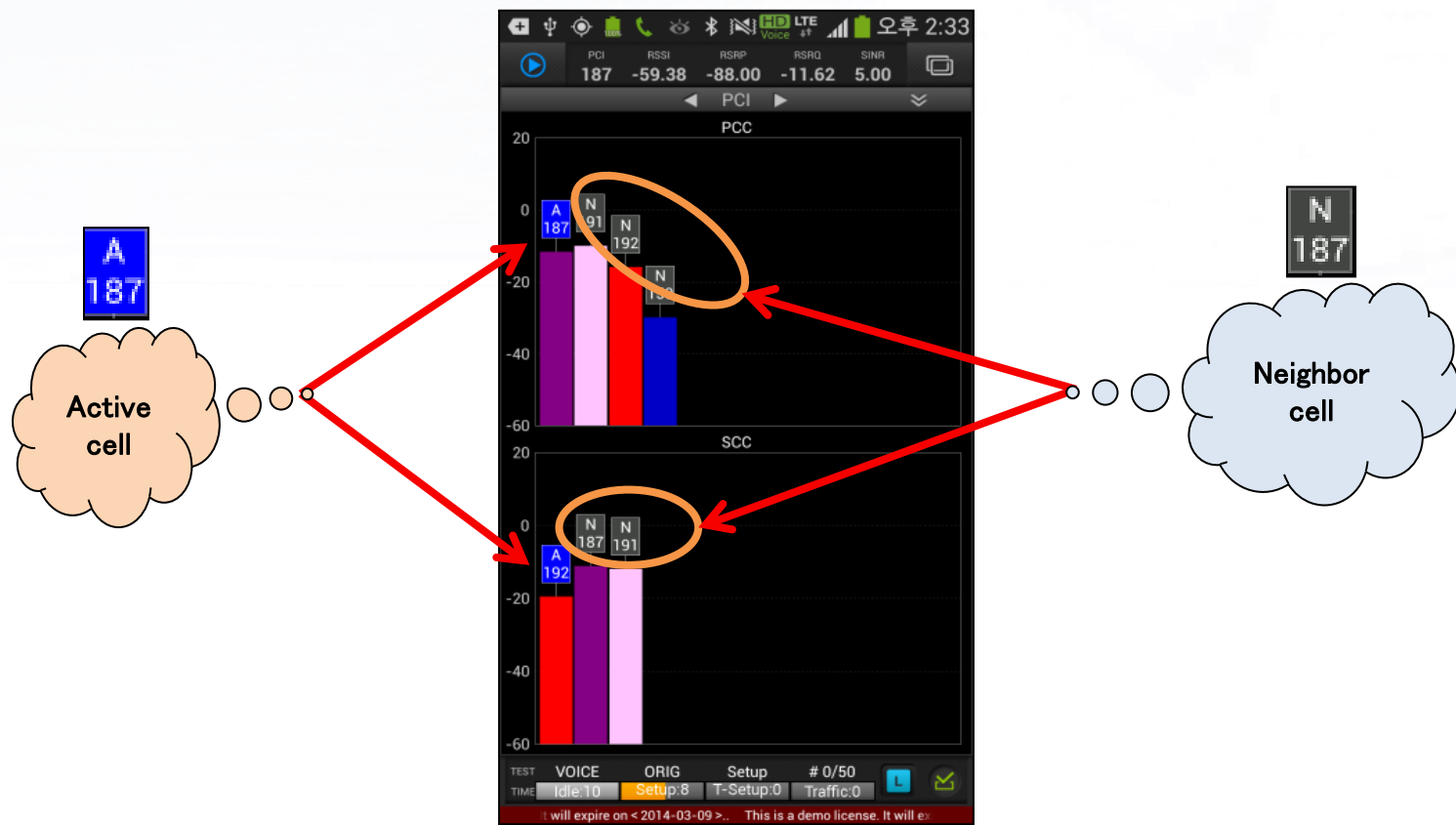


➡ Parsingを実行した場合、詳細を確認できる

PCI

LTE (WCDMA 等、その他NetworkではPSC) Active cell とNeighbor list

※ PCC (Primary Component Carrier), SCC (Secondary Component Carrier)



SERVING

端末 Antenna 0,1にて受信するRF Signalの変化の詳細を表示



受信したReference signal を数値で表示(Downlink)

- RSRP : Reference Signal Received Power
- RSRQ : Reference Signal Received Quality
- SINR : Signal to Interference plus noise Rate
- RSSI : Received Signal Strength Indicator

端末が送信するチャンネル状態を数値で表示(Uplink)

- PUSCH, PUCCH : Uplink channel
- SRS : Downlink 品質把握因子

上端表示の数値をグラフに表示し、変化を見やすく、把握できるよう表示

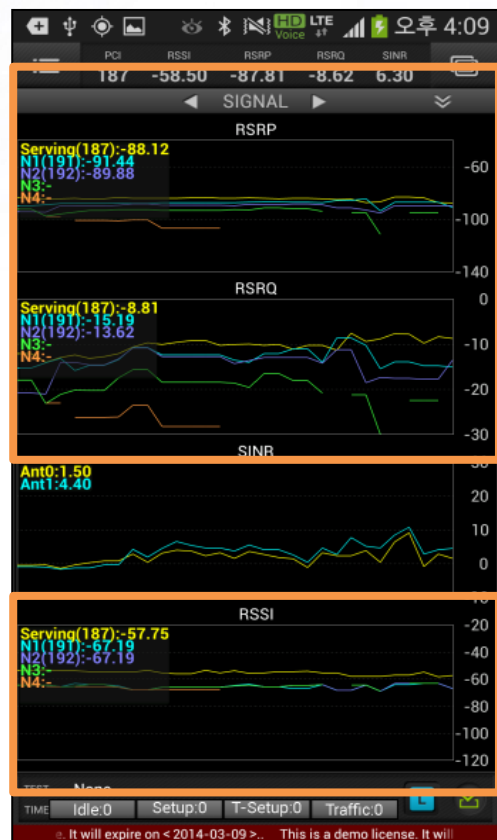
PARAM

端末が受信したRF Signalの状態を値で表示



Signal

端末が受信したRF Signalの状態をグラフで表示



Map/ Indoor

Google Mapと室内図面を利用したLegend出力



測定周波数帯域

WINd APPは端末で使用されるので端末の該当周波数帯域を測定。

即ち、各通信事業者別の端末の周波数に対応してPCI値を表示する。画面表示詳細

The screenshot shows the WINd APP interface on a mobile device. At the top, there's a status bar with various icons and the time 1:20 PM. Below that, a row of network parameters is displayed: PCI (225), RSSI (-66.88), RSRP (-94.44), RSRQ (-7.38), and SINR (5.30). A 'LIST' button is visible. Below the status bar, there are three tabs: 'Network', 'EMM', and 'ESM'. The 'Network' tab is selected, showing a 'Network Info' section. This section contains a list of network parameters and their values: PCI (225), DL EARFCN (1350), UL EARFCN (19350), UL Bandwidth (20 MHz), DL Bandwidth (20 MHz), Cell ID (5139227), TAC (2056), Frequency Band (1800 MHz), MCC (450), MNC (5), and Allowed Access (Full). At the bottom, there's a 'TEST' section with 'None' selected, and a 'TIME' section with 'Idle:0', 'Setup:0', 'T-Setup:0', and 'Traffic:0'. A red banner at the very bottom says 'will expire on < 2014-03-09 >.. This is a d'.

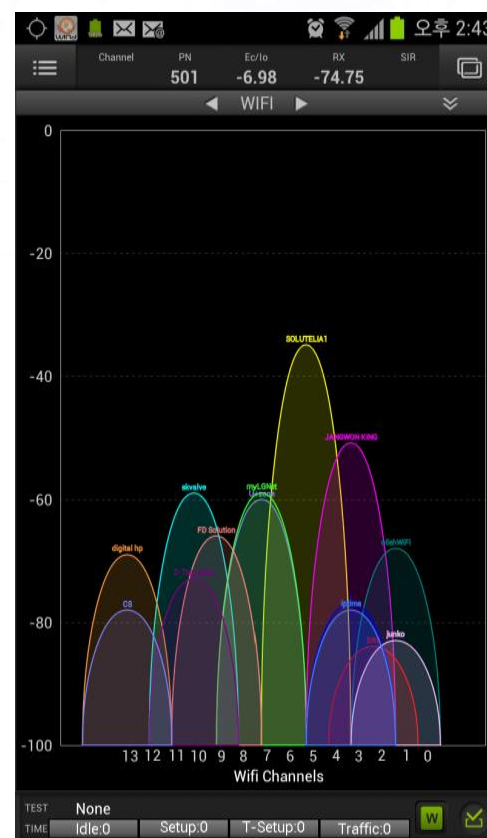
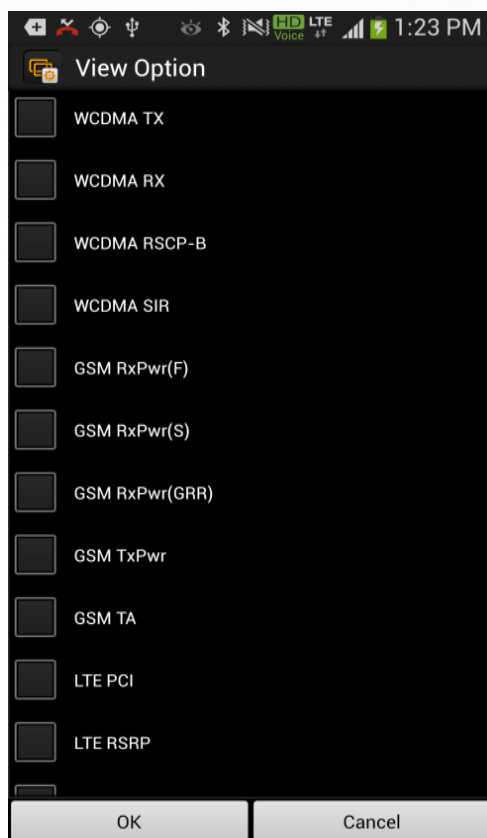
PCI	Physical Cell Identifier
DL EARFCN	Downlink Radio Frequency Channel Number
UL EARFCN	Uplink Radio Frequency Channel Number
UL Bandwidth	Uplink Bandwidth
DL Bandwidth	Downlink Bandwidth
Cell ID	Cell ID
TAC	Tracking Area Code
Frequency Band	Frequency Band
MCC	Mobile Country Code
MNC	Mobile Network Code
Allowed Access	Full

測定可能変調方式

GSM(GPRS), CDMA(EVDO_rev.0, A,B), WCDMA(HSDPA,HSUPA,HSPA+), LTE, LTE-A 等

最近の移動通信 Protocol を測定及び Wi-Fi 信号のScan 可能

※LTE-TDD (TD-LTE)は機能開発中



WIND server™/ WIND App™ と連動して遠隔制御を monitoring ができるTool



Real Time
Remote Control
/Monitoring



マルチアクセス



Off-line Replay



Report 作成

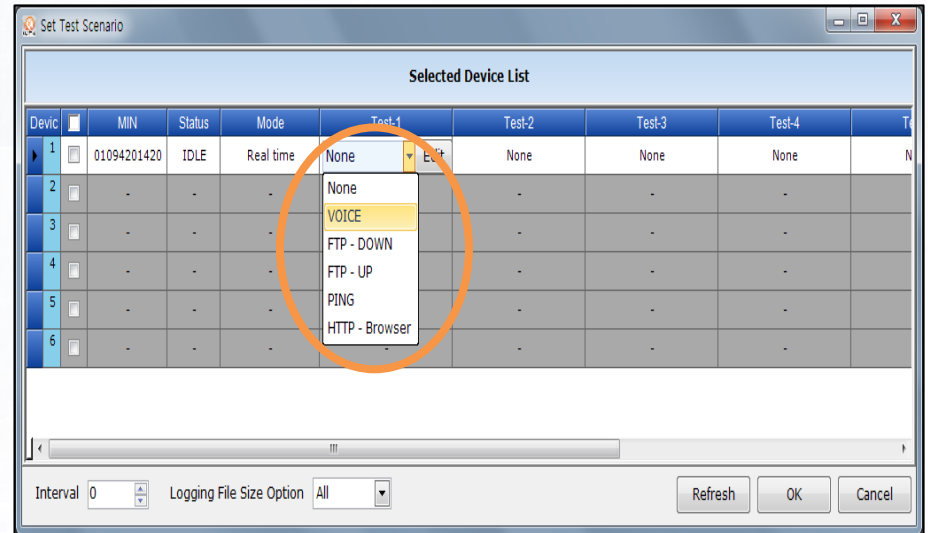
Time	Lat	Lon	Alt	Speed	Heading	Roll	Pitch	Yaw	RollRate	PitchRate	YawRate	RollAcc	PitchAcc	YawAcc
2010/01/01 00:00:00	35.6812	139.7611	100	0	0	0	0	0	0	0	0	0	0	0
2010/01/01 00:00:01	35.6812	139.7611	100	0	0	0	0	0	0	0	0	0	0	0
2010/01/01 00:00:02	35.6812	139.7611	100	0	0	0	0	0	0	0	0	0	0	0
2010/01/01 00:00:03	35.6812	139.7611	100	0	0	0	0	0	0	0	0	0	0	0
2010/01/01 00:00:04	35.6812	139.7611	100	0	0	0	0	0	0	0	0	0	0	0
2010/01/01 00:00:05	35.6812	139.7611	100	0	0	0	0	0	0	0	0	0	0	0
2010/01/01 00:00:06	35.6812	139.7611	100	0	0	0	0	0	0	0	0	0	0	0
2010/01/01 00:00:07	35.6812	139.7611	100	0	0	0	0	0	0	0	0	0	0	0
2010/01/01 00:00:08	35.6812	139.7611	100	0	0	0	0	0	0	0	0	0	0	0
2010/01/01 00:00:09	35.6812	139.7611	100	0	0	0	0	0	0	0	0	0	0	0
2010/01/01 00:00:10	35.6812	139.7611	100	0	0	0	0	0	0	0	0	0	0	0

Remote controlによる

Test Plan 設定及び実行

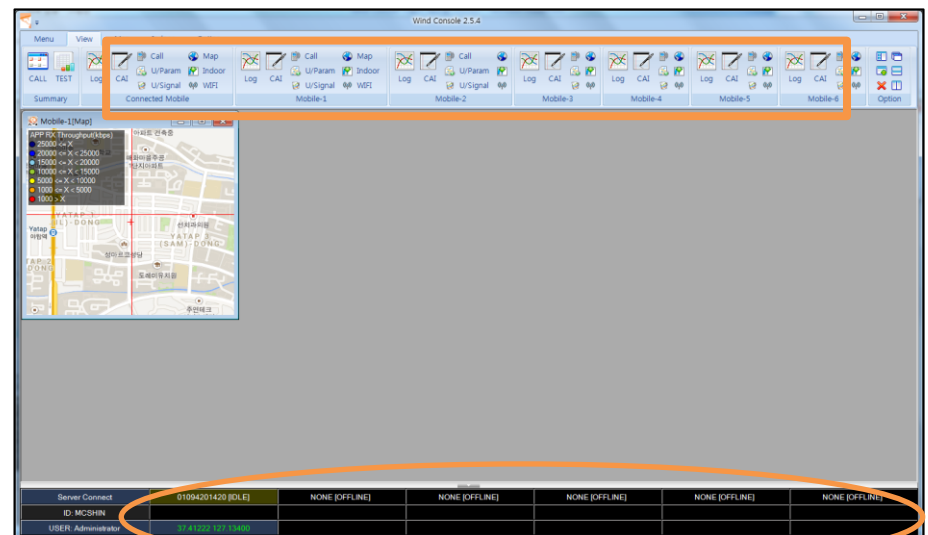
WINd Console™は右の図のように
5種類のAuto test callを設定して
連動した“WINd App™”にて実行可能

- Voice call
- FTP – Upload test
- FTP – Download test
- Ping test
- HTTP test



“WINd App™” Remote control

WINd Console™は右の図のように
6個の“WINd App™”を同時に
Remote control ができる



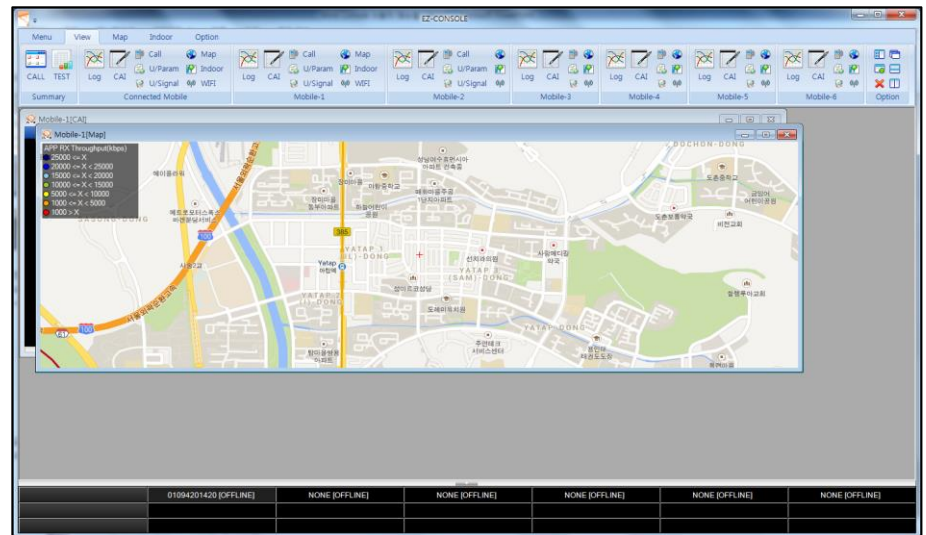
Remote controlによる

“WINd App™” Monitoring

RF Parameter、Network InformationなどをRemote controlによりリアルタイムでmonitoringができる

- RF parameter
- Network information
- Serving signal
- Active cell , Neighbor cell

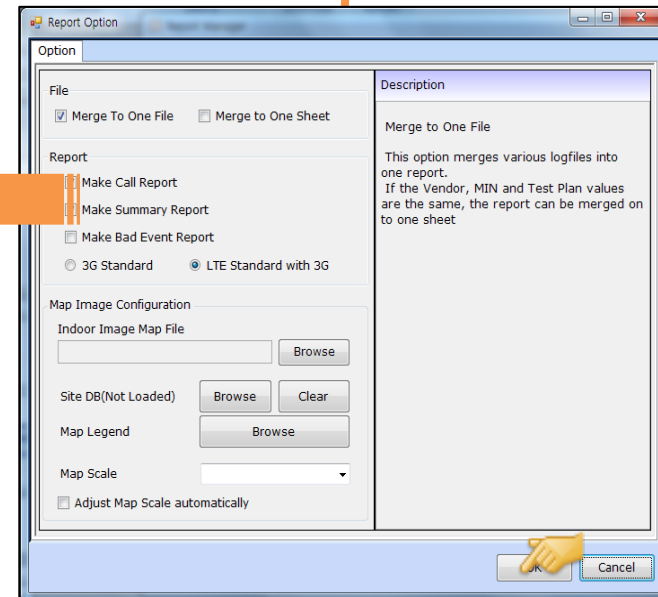
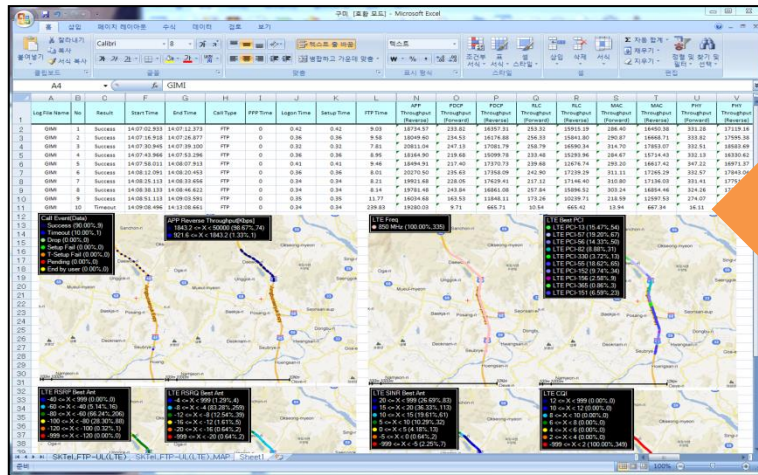
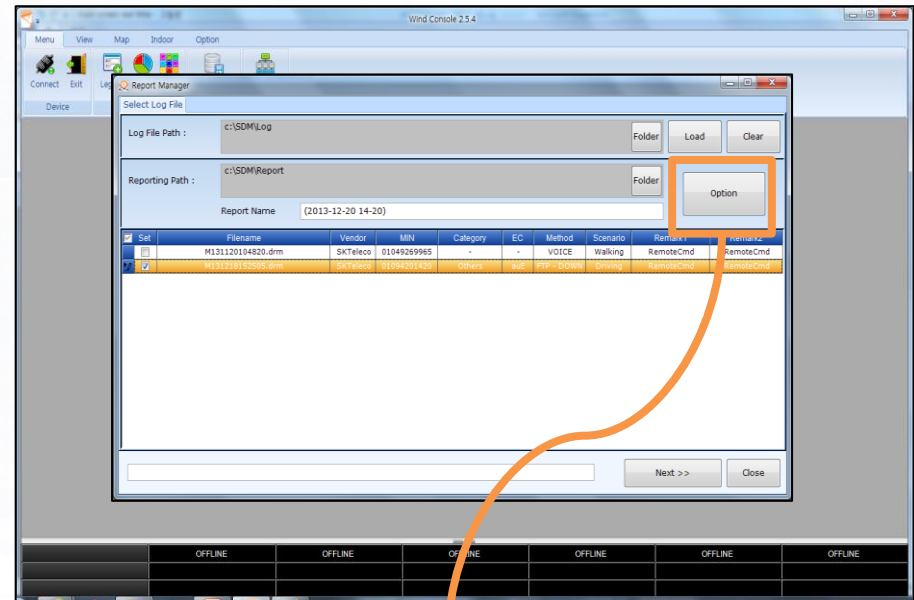
受信したGPS座標をもってGoogle mapをリアルタイムでdownloadしてMap legendを表示



Report 作成

下記の図のように測定したDataを用いてreport作成可能.

Test結果についてSummaryをリアルタイムに確認できる



Wind solution の運用状態を管理



■ NOT REGISTER ■ OFFLINE
■ IDLE ■ TESTING
■ UPLOADING ■ RESERVATION

リソース 運用状態

- 端末 / 利用者運用状態
- 当日発生した Event/ Logfile Upload 数量



User Management



Mobile Management

管理

- 利用者 / 端末登録、削除及び等級管理



Plan & Command



Reservation Management

予約

- Test Plan / Logging File Upload 予約
- Off-line Replay

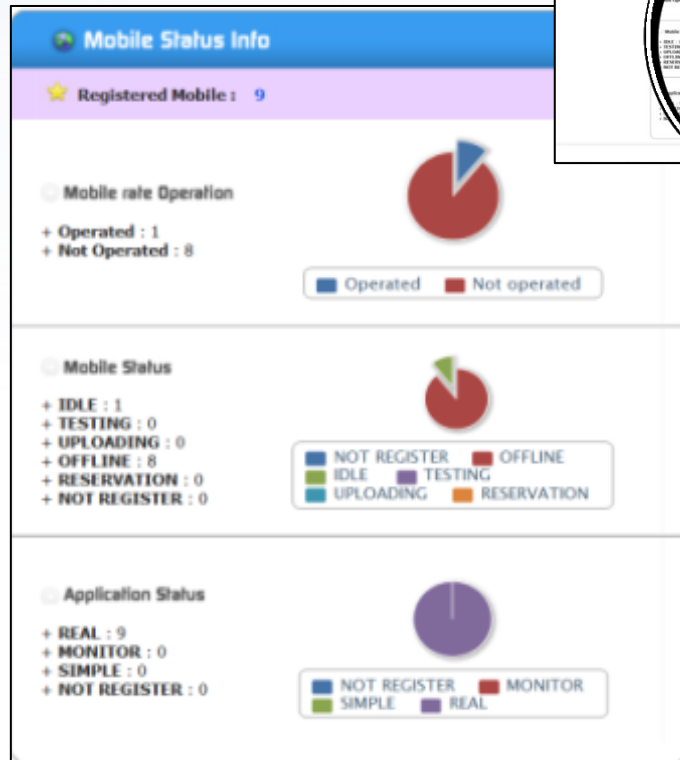


Report Management

保存

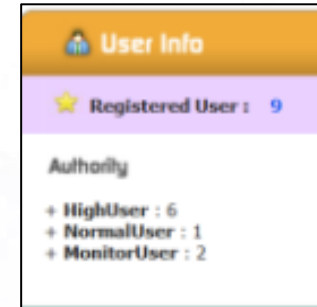
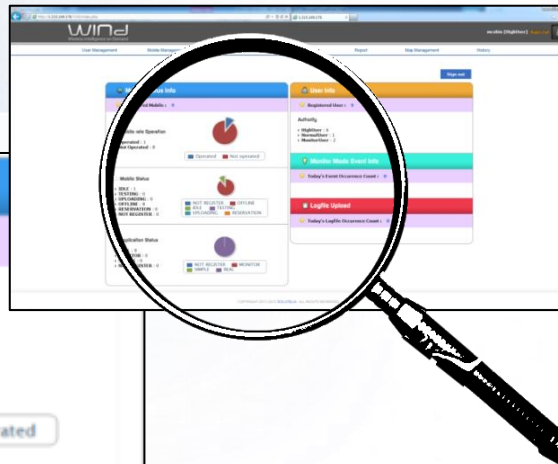
- Logging File / Report 保存
- 保存されたFileを項目別に検索可能

リソース運用状態



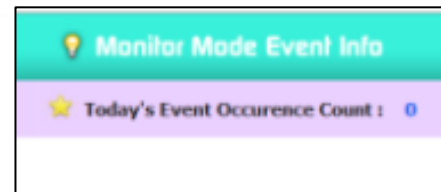
Mobile Status Info

登録された端末機の運用状態を出力



User Info

Serverに接続された作業者の
現況を出力



Monitor Mode Event Info

当日発生したEvent件数出力



Logfile Upload

当日取得したLogfile Upload 件数出力

MANAGEMENT

■ 作業者

登録、削除、管理等級制御

windroot (HighUser) : server solutelia Change Server Management Sign Out

User Management

User User Name User ID Password Confirm Password Select Authorization 6 CH Add User Search User

• User List

Select	Name	ID	Authorization	Mobile Group	Mobile	E-mail	Memo	Console Type
☐	grp	grp id	HighUser					6 CH
☐	hmpark	hmpark	HighUser					6 CH
☐	yjhan	yjhan	HighUser					6 CH
☐	cartaris	cartaris	HighUser					6 CH
☐	Mohsen	mdavani	HighUser					6 CH
☐	jkim	jkim	HighUser					6 CH
☐	solutelia	solutelia	HighUser					6 CH
☐	solutelia2	solutelia2	HighUser					6 CH
☐	solutelia1	solutelia1	HighUser					6 CH
☐	jeon	bb22	HighUser					6 CH
☐	WIND root	windroot	HighUser		0001111222	windroot@solutelia.com		6 CH

■ WIND App™ 管理

登録、削除、運用状態

windroot (HighUser) : server solutelia Change Server Management Sign Out

Mobile Management

Mobile Mobile Group MIN IMEI Mobile Model Add Mobile Search Device

• Mobile List Status Filter: All Selected Group: All Group Edit

Select	Phone ID	Mobile Group	MIN	IMEI	Mobile Model	Status
☐	95	default	01040209865	359796047536677	Galaxy N1	OFFLINE
☐	94	Solutelia-Asia(Kar)	01085465619	359796044792455	SHV-E1605	OFFLINE
☐	93	Solutelia-Asia(Kar)	01077672112	35451605068830	SHV-E250L	OFFLINE
☐	91	Solutelia-Asia(Kar)	01071785387	357441058797098	GalaxyS4	IDLE
☐	89	Solutelia-Asia(Kar)	01028237065	358913049153358	SHV-H350K	OFFLINE
☐	86	Solutelia-Asia(Kar)	01094201420	356432055668753	SHV-E3305	OFFLINE
☐	85	Solutelia-Asia(Kar)	9108296987	99000333545011	SHV-L750	OFFLINE
☐	56	Solutelia-Asia(Kar)	14099994649	359100040039898	SHV-E1605	OFFLINE
☐	55	Solutelia-Denver	3035528636	99000334345447	SOH-1535	OFFLINE
☐	44	Solutelia-Denver	3035526942	99000333545011	SOH-1535	OFFLINE

1.2.3.

Test Plan 設定

- 運用者が“WINd App™”にて使用する Test planを設定保存可能
- Test planを設定後、Remote controlして指定した端末機にDownloadして“WINd App™”にて自動実行

The screenshot shows the 'Scenario' configuration page in the WINd web interface. The page has a header with the WINd logo and user information (windroot (HighUser) : server solutelia). Below the header is a navigation bar with links: User Management, Mobile Management, Plan & Command, Reservation, Event, Report, Map Management, and History. The main content area is titled 'Scenario' and contains a 'Select Scenario' dropdown, 'Load' and 'Delete' buttons, and a form with various configuration fields.

Scenario	
Scenario Name	
Memo	
Select Plan	☐ Voice ☒ Ftp Down ☐ Ftp Up ☐ Ping ☐ Http Browser ☐ Http Get ☐ Http Put ☐ Mail ☐ SMS ☐ IPERF
Idle Time (second)	10
Setup Time (second)	28
Traffic Setup Time (second)	30
Traffic Time (second)	60
Dormant Time (second)	30
Call Count	40
Server Address	
Port	21
User Name	
Password	
WIFI Hybrid	Off
Passive	☐
Call Type	CONTINUOUS
File Name	
File Directory	
Buff Size (byte)	4096
Repeat Test	☐
Repeat Count	0
Repeat Delay (second)	0

Reservation

- 端末に保存されたLogging File Upload 時間予約可能
 - Test Plan 実行時間予約可能
- ※ 時間を指定できることで
商用ネットワークを効率的に利用できる

The screenshot shows the 'Reservation Management' page in the WINd web interface. The page has a header with the WINd logo and user information (windroot (HighUser) : server solutelia). Below the header is a navigation bar with links: User Management, Mobile Management, Plan & Command, Reservation, Event, Report, Map Management, and History. The main content area is titled 'Reservation Management' and contains a table of reservation data.

Select	Mobile Group	MIN	IMEI	Mobile Model	Status	Reservation Name
☐	Solutelia-Denver	13035472077	353091052219591	SGH-I747	OFFLINE	korea test
☐	Solutelia-Denver	7205520400	99000213161865	SGH-I535	OFFLINE	korea test
☐	Solutelia-Denver	13035475680	355431051336525	SGH-I747	OFFLINE	korea test
☐	Solutelia-Denver	13038825899	355431051336194	SGH-I747	OFFLINE	korea test
☐	Solutelia-Asia(Kor)	01048410073	359796044610368	SHV-E1605	OFFLINE	

保存機能

WIND
Wireless Intelligence on Demand

windroot (HighUser) : server solutelia Change Server Management Sign Out

User Management Mobile Management Plan & Command Reservation Event Report Map Management History

Report Management

Logging Info Reportfile Info

Start Date 2013-12-18 End Date 2014-01-17 File Name All Search Log

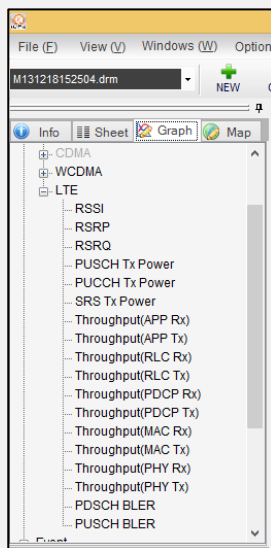
Select	Date	Group	MIN	FileName	Logging File	Memo
☐	2014-01-14 13:34:05	Solutelia-Denver	3035527184	M140114114116_ev.drm.zip	Download	
☐	2014-01-14 13:30:10	Solutelia-Denver	3035527184	M140114114116_CallList.csv	Download	
☐	2014-01-09 13:40:34	Solutelia-Asia(Kor)	01077672112	M131220165932_1.drm.zip	Download	

1.

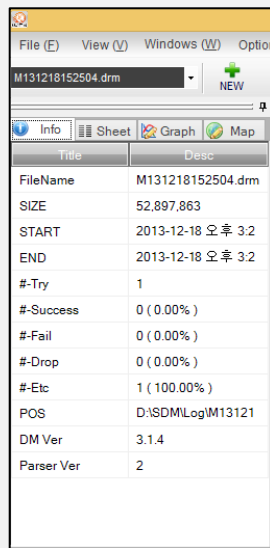
Downloads Delete

- 端末に保存されているLogging Fileを Downloadして自動で保存できる
- “WIND console™”にて制作したReport fileをDownloadして保存できる
- 保存したFileを日付別、File Name別に検索して利用できる

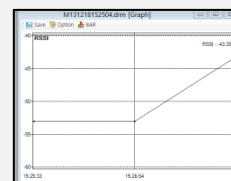
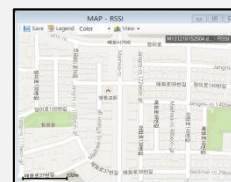
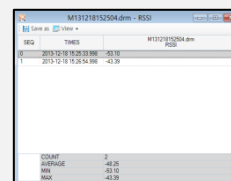
Windows OS 基盤の Post Processing Analysis Software



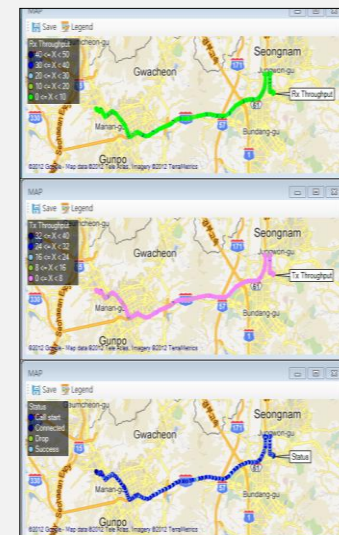
- RF parameter 別出力



- Test call 別詳細出力



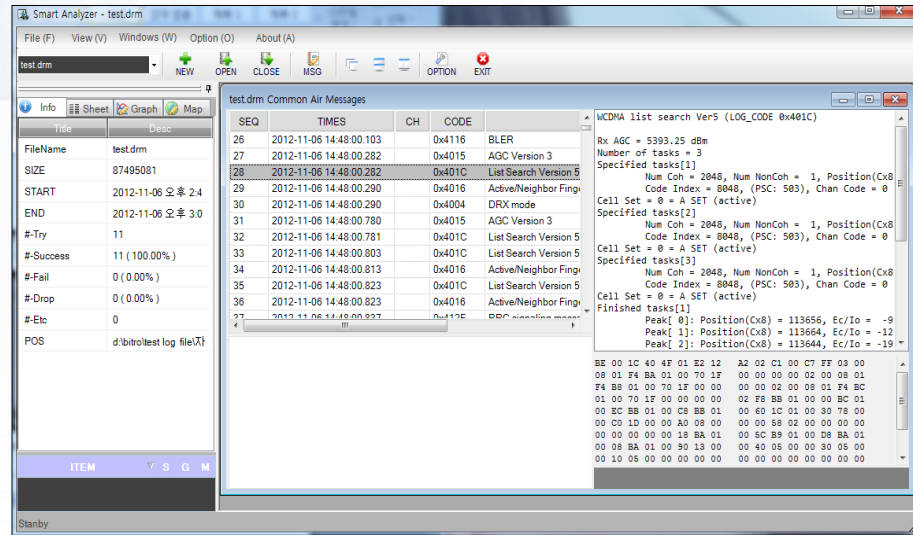
- Map/ Graph/ Messageなどに Parsing / 出力



- Google Map 利用して / Mapping 出力

Message 分析仮面

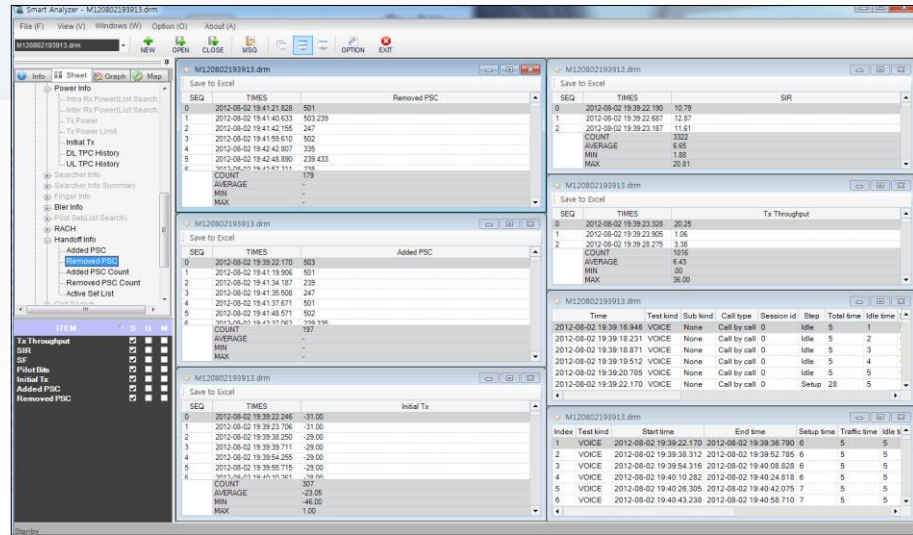
(Parser 機能)



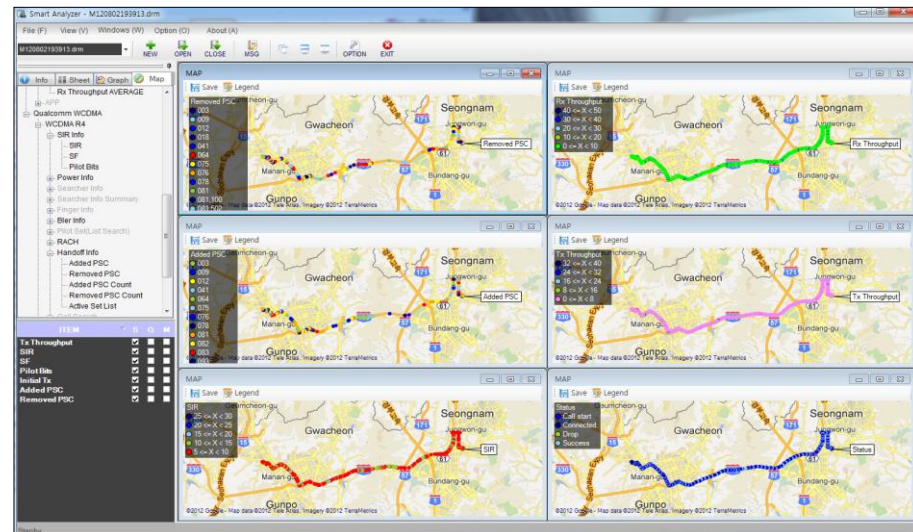
分析 Data Graph 出力



分析Data Sheet 出力



分析Data Map 出力



機能と特徴

App.具現

不可装置なし
/場所制約なし

Real Time MAP Display

現場問題を即時に把握

Remote Control

無人 Test 可能

遠隔 Test

人員/コストの最小化

Graphic化

基地局環境分析が容易

In-door Test

室内、地下鉄測定

Signal Message 分析

Real Time Parsing · 출력

AUTO Update

場所 · 時間制約なし

測定 DATA upload

Wi-Fi · 商用網活用

DATA 保存/Replay

DB構築及び Knowhowの
蓄積/技術伝授が容易

Reservation

時間及び Network
の効率的な活用

測定 Log File /Report 保存

大容量保存