



**WITH THE COLLABORATION OF YONSEI UNIVERSITY**



**연세대학교**  
YONSEI UNIVERSITY

**SMARTPHONE & MOBILE NETWORK PROJECT**

**COURSE 2: SMART DEVICE & MOBILE EMERGING  
TECHNOLOGIES**

**PROJECT 1: SMARTPHONE & NETWORK ANALYSIS**

**PROJECT 2: OBSERVATION ON THE NETWORK TESTING  
BASED ON TWO DIFFERENT SMARTPHONE**

**NAME: AHMAD MUSTAFFA BIN ZAKARIA**

**UNIVERSITY: UNIVERSITI TEKNOLOGI MARA(UiTM), MALAYSIA(ALUMNI)**




**INSTRUCTOR: PROF. JONG MOON CHUNG**

**(DIRECTOR, COMMUNICATIONS & NETWORKING LABORATORY, YONSEI  
UNIVERSITY, SEOUL, SOUTH KOREA)**

# PROJECT 1: SMARTPHONE & NETWORK ANALYSIS

System

Android

4G  (1)		22:40	 
← AIDA64 / System		⋮	
Manufacturer	vivo		
Model	vivo 1714		
Brand	vivo		
Board	mt6750		
Device	1714		
Hardware	mt6755		
Platform	mt6750		
Product	1714		
Serial	JFRSLFZLSO9SFICI		
Installed RAM	3 GB		
Total Memory	2815 MB		
Available Memory	667 MB		
Internal Storage	24.05 GB		
Total Space			
Internal Storage	3327 MB		
Free Space			
External Storage	29.80 GB		
Total Space			
External Storage	11.27 GB		
Free Space			

iPhone

Device

9:19

4G

< AIDA64

Device

BASIC PROPERTIES

Device

iPhone XR

Dock Connector

Lightning

SIM Card Type

Nano-SIM + eSIM

Device String

iPhone11,8

Device Id

N841AP

Released

12 Sep 2018

CAPABILITIES

Cellular

Yes

GPS

Yes

NFC

Yes

Force Touch

No

BLUETOOTH

Version

5.0

Controller

USI 339S00580

Bluetooth Smart (LE)

Yes

Memory

9:20

4G

< AIDA64

Memory

STORAGE INFORMATION

Device Model

256 GB

Total Storage

238.37 GB

Available Storage

90.76 GB

RAM INFORMATION

Total RAM

2845 MB

Available RAM

115 MB

9:20

4G

< AIDA64

Memory

STORAGE INFORMATION

Device Model

256 GB

Total Storage

238.37 GB

Available Storage

90.76 GB

RAM INFORMATION

Total RAM

2845 MB

Available RAM

115 MB

CPU/PROCESSOR

Android	iPhone
<div><div>4G 22:41 4G</div><div><div>←</div><div>AIDA64 / CPU</div><div></div></div><div><div><div>SoC Model</div><div>MediaTek MT6750</div></div><div><div>Core</div><div>8x ARM Cortex-A53 @</div></div><div><div>Architecture</div><div>1508 MHz</div></div><div><div>Manufacturing Process</div><div>28 nm</div></div><div><div>Instruction Set</div><div>64-bit ARMv8-A</div></div><div><div>CPU Revision</div><div>r0p2</div></div><div><div>CPU Cores</div><div>8</div></div><div><div>CPU Clock Range</div><div>156 - 1508 MHz</div></div><div><div>Core 1 Clock</div><div>598 MHz</div></div><div><div>Core 2 Clock</div><div>(sleeping)</div></div><div><div>Core 3 Clock</div><div>(sleeping)</div></div><div><div>Core 4 Clock</div><div>(sleeping)</div></div><div><div>Core 5 Clock</div><div>(sleeping)</div></div><div><div>Core 6 Clock</div><div>(sleeping)</div></div><div><div>Core 7 Clock</div><div>(sleeping)</div></div><div><div>Core 8 Clock</div><div>(sleeping)</div></div><div><div>CPU Utilization</div><div>24 %</div></div><div><div>Scaling Governor</div><div>interactive</div></div></div></div>	<div><div>9:22 4G</div><div><div>&lt; AIDA64</div><div>Processor</div></div><div><div>CPU PROPERTIES</div><div><div>CPU</div><div>Apple A12</div></div><div><div>Speed</div><div>2490 MHz</div></div><div><div>Manufacturer</div><div>TSMC</div></div><div><div>Instruction Set</div><div>64-bit ARMv8-A</div></div><div><div>Microarchitecture</div><div>Bionic</div></div><div><div>Technology</div><div>7 nm</div></div><div><div>Core Count</div><div>6</div></div><div><div>Active Core Count</div><div>6</div></div></div><div><div>GPU PROPERTIES</div><div><div>GPU Type</div><div>Apple GPU</div></div><div><div>GPU Cores</div><div>4</div></div></div><div><div>CO-PROCESSOR PROPERTIES</div><div><div>Co-processor</div><div>Apple M12</div></div></div></div>






DISPLAY

Android	iPhone
<div><div>4G 22:41 4G</div><div>← AIDA64 / Display ⋮</div><div><div>Screen Resolution720 × 1280</div><div>Screen Size68 mm × 121 mm</div><div>Screen Diagonal5.46 inches</div><div>Pixel Density269 dpi (xhdpi)</div><div>xdpi / ydpi269 / 269 dpi</div><div>GPU VendorARM</div><div>GPU RendererMali-T860</div><div>Refresh Rate61 Hz</div><div>Default OrientationPortrait</div><div>OpenGL ES Version3.2</div><div>GPU VersionOpenGL ES 3.2 v1.r12p0-04rel0.44f2946824bb8739781564bffe2110c9</div><div>OpenGL ES Extensions:<div>GL_EXT_debug_marker</div><div>GL_ARM_rgba8</div><div>GL_ARM_mali_shader_binary</div><div>GL_OES_depth24</div><div>GL_OES_depth_texture</div></div></div></div>	<div><div>9:23 4G</div><div>← AIDA64 Display</div><div><div>SCREEN SIZE</div><div><div>Screen Size6.10"</div><div>Aspect Ratio19.5:9</div><div>Pixel Density326 PPI</div></div><div>SCREEN PARAMETERS</div><div><div>Vertical Resolution1792 Pixels</div><div>Horizontal Resolution828 Pixels</div><div>Contrast1400:1</div><div>Brightness625 cd/m²</div><div>TechnologyIPS</div><div>Refresh Rate60Hz</div><div>Color GamutDCI-P3</div></div></div></div>

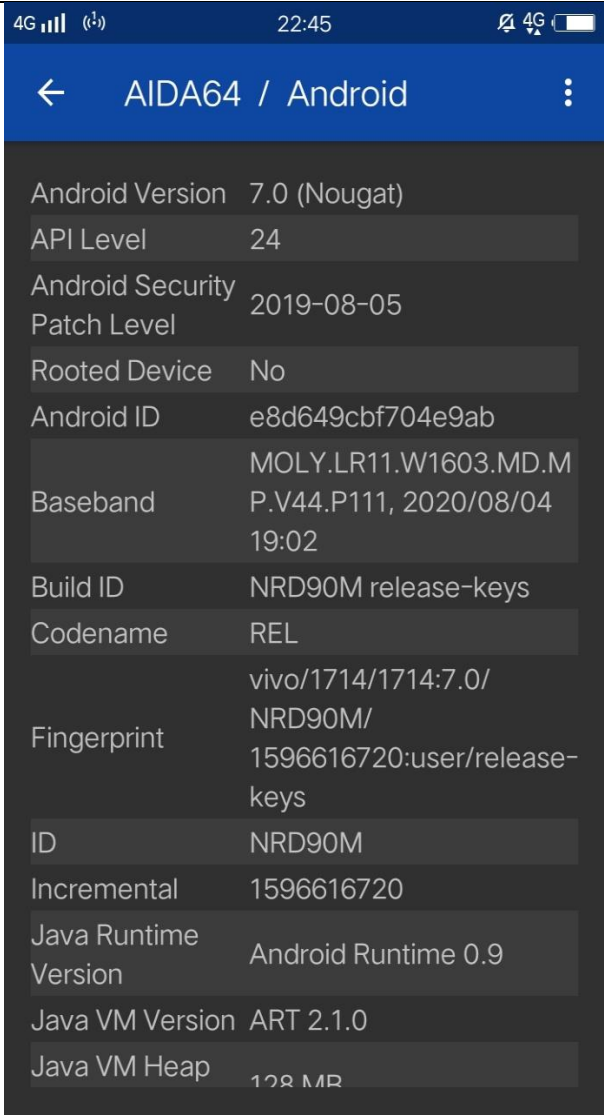
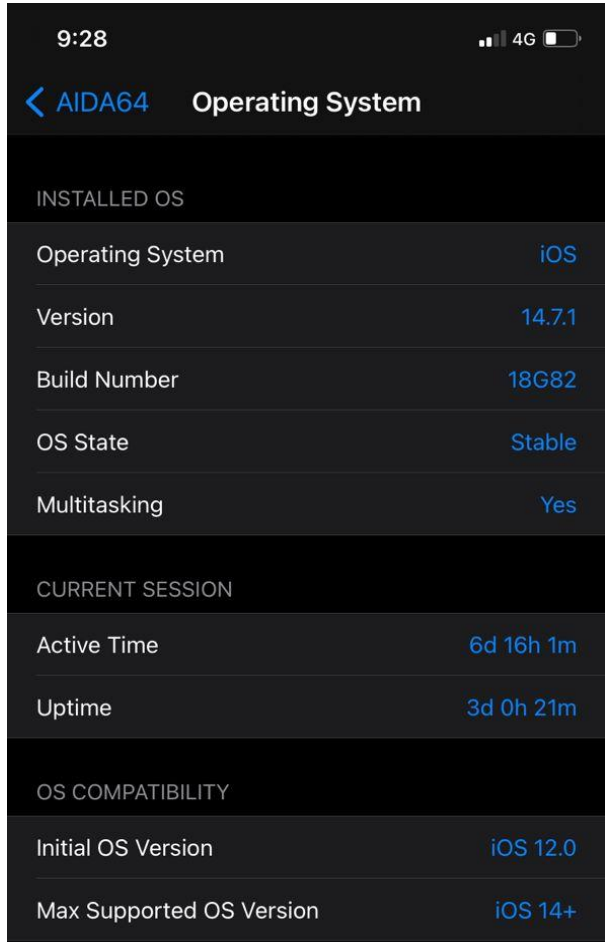
NETWORK

Android	iPhone
<div><div>4G 22:42 4G</div><div><div>←</div><div>AIDA64 / Network</div><div>⋮</div></div><div><div>Telephony</div><div><div>Phone Type</div><div>GSM</div></div><div><div>Network Operator Name</div><div>U Mobile Stay Safe</div></div><div><div>Network Operator Code</div><div>50218</div></div><div><div>Network Operator Country</div><div>Malaysia</div></div><div><div>SIM Provider Name</div><div>U MOBILE</div></div><div><div>SIM Provider Code</div><div>50218</div></div><div><div>SIM Provider Country</div><div>Malaysia</div></div><div><div>SIM State</div><div>Ready</div></div><div><div>Network Type</div><div>LTE</div></div><div><div>Data Connection State</div><div>Connected</div></div><div><div>Data Activity</div><div>None</div></div><div><div>Device Is</div><div>...</div></div></div></div>	<div><div>9:25 4G</div><div><div>← AIDA64</div><div>Network</div></div><div><div>CELLULAR</div><div><div>#1 Carrier name</div><div>yoodo</div></div><div><div>#2 Carrier</div><div>Not found</div></div><div><div>Capabilities</div><div>GSM/UMTS/HSDPA/LTE</div></div><div><div>Baseband</div><div>Intel XMM 7560</div></div></div><div><div>ASSIGNED IP ADDRESSES</div><div><div>Wi-Fi (IPv4)</div><div>192.168.0.174</div></div><div><div>Wi-Fi (IPv6)</div><div>fe80::827:3f8c:f1f3:76db</div></div><div><div>Cellular (IPv4)</div><div>10.218.29.183</div></div><div><div>Cellular (IPv6)</div><div>Not Available</div></div></div><div><div>WI-FI DETAILS</div><div><div>SSID</div><div>Not Connected</div></div><div><div>BSSID</div><div>Not Connected</div></div><div><div>Capabilities</div><div>802.11 a/b/g/n/ac</div></div><div><div>Controller</div><div>USI 339S00580</div></div></div></div>

SENSOR

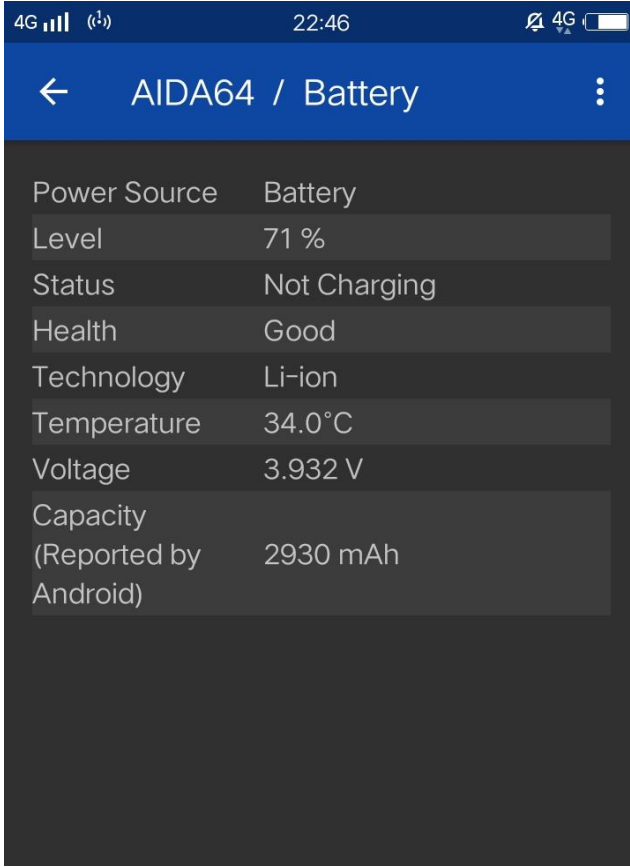
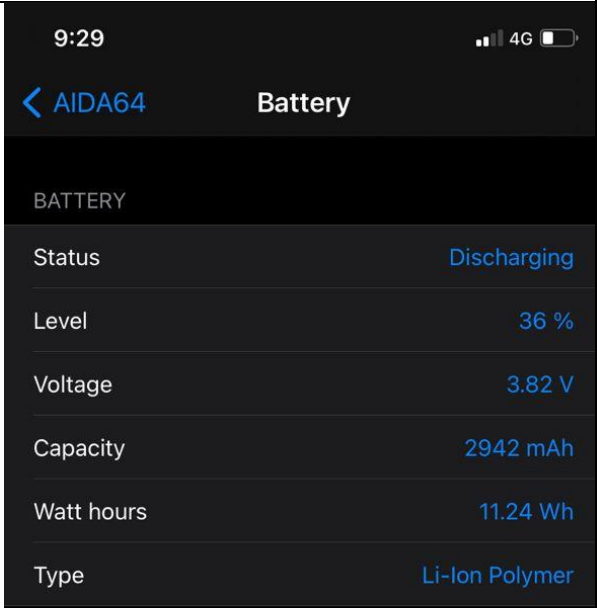
Android	iPhone
<div><div>4G 22:44</div><div>← AIDA64 / Sensors ⋮</div><div><div>lis2ds12-accel</div><div>x: 0.4 / y:-0.2 / z: 10.2 m/s<sup>2</sup></div><div>YAS537 Magnetic</div><div>x: 35.5 / y:-10.3 / z: 10.2 μT</div><div>YAS537 Orientation</div><div>Azimuth: 254.1 / Pitch: 0.9 / Roll: 2.5</div><div>YAS537-pseudo-gyro</div><div>x: 0.0 / y: 0.0 / z: 0.0 rad/s</div><div>APDS9922-light</div><div>31.0 lux</div><div>APDS9922-proximity</div><div>5.0 cm</div><div>YAS537 Gravity</div><div>x: 0.4 / y:-0.2 / z: 9.8 m/s<sup>2</sup></div><div>YAS537 Linear Acceleration</div><div>x: 0.1 / y:-0.1 / z: 0.4 m/s<sup>2</sup></div><div>YAS537 Rotation Vector</div><div>x: 0.0 / y: 0.0 / z: 0.8</div><div>lis2ds12-step_d</div><div>lis2ds12-step_c</div><div>002 steps</div></div></div>	<div><div>9:28 4G</div><div>← AIDA64 Sensor Information</div><div>GPS</div><div><div></div><div>True Heading</div><div>12.555°</div></div><div>ROTATION</div><div><div></div><div>Roll</div><div>0.65g</div><div>Pitch</div><div>1.42g</div><div>Yaw</div><div>-2.36g</div></div><div>ACCELERATION</div><div><div></div><div>X Axis</div><div>0.09g</div><div>Y Axis</div><div>-0.99g</div><div>Z Axis</div><div>-0.12g</div></div><div>MAGNETIC FIELD</div><div><div></div><div>X Axis</div><div>-1.59</div><div>Y Axis</div><div>3.60</div><div>Z Axis</div><div>-34.81</div><div>Accuracy</div><div>2.00</div></div><div>RAW MAGNETIC FIELD</div><div><div><div>RAW</div><div>X Axis</div><div>-38.78</div><div>Y Axis</div><div>33.02</div><div>Z Axis</div><div>-35.64</div></div></div></div>

## OPERATING SYSTEM

Android	iPhone
 <p>4G 22:45</p> <p>← AIDA64 / Android</p> <p>Android Version 7.0 (Nougat)</p> <p>API Level 24</p> <p>Android Security Patch Level 2019-08-05</p> <p>Rooted Device No</p> <p>Android ID e8d649cbf704e9ab</p> <p>Baseband MOLY.LR11.W1603.MD.M P.V44.P111, 2020/08/04 19:02</p> <p>Build ID NRD90M release-keys</p> <p>Codename REL</p> <p>Fingerprint vivo/1714/1714:7.0/NRD90M/1596616720:user/release-keys</p> <p>ID NRD90M</p> <p>Incremental 1596616720</p> <p>Java Runtime Version Android Runtime 0.9</p> <p>Java VM Version ART 2.1.0</p> <p>Java VM Heap 128 MB</p>	 <p>9:28 4G</p> <p>&lt; AIDA64 Operating System</p> <p>INSTALLED OS</p> <p>Operating System iOS</p> <p>Version 14.7.1</p> <p>Build Number 18G82</p> <p>OS State Stable</p> <p>Multitasking Yes</p> <p>CURRENT SESSION</p> <p>Active Time 6d 16h 1m</p> <p>Uptime 3d 0h 21m</p> <p>OS COMPATIBILITY</p> <p>Initial OS Version iOS 12.0</p> <p>Max Supported OS Version iOS 14+</p>



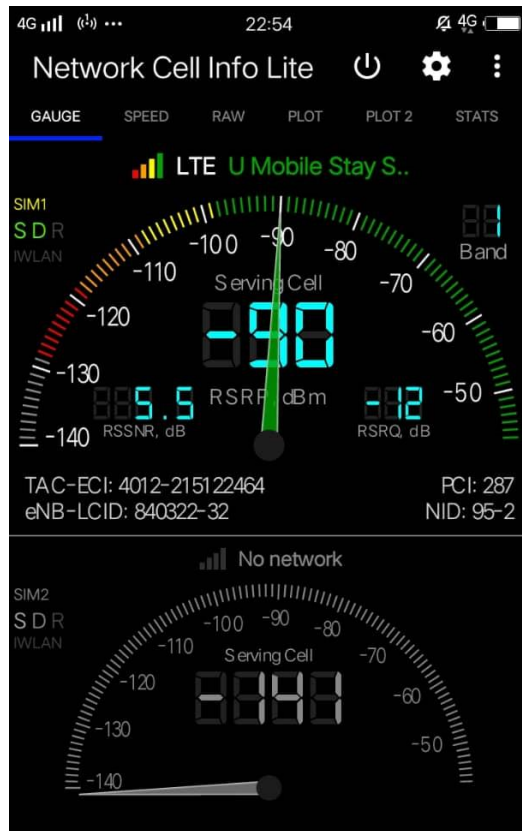
BATTERY

Android	iPhone																														
 <p>The screenshot shows the AIDA64 Battery status screen on an Android device. The status bar at the top displays '4G', signal strength, time '22:46', and battery level. The app header is 'AIDA64 / Battery'. The battery details are as follows:</p> <table><tr><td>Power Source</td><td>Battery</td></tr><tr><td>Level</td><td>71 %</td></tr><tr><td>Status</td><td>Not Charging</td></tr><tr><td>Health</td><td>Good</td></tr><tr><td>Technology</td><td>Li-ion</td></tr><tr><td>Temperature</td><td>34.0°C</td></tr><tr><td>Voltage</td><td>3.932 V</td></tr><tr><td>Capacity (Reported by Android)</td><td>2930 mAh</td></tr></table>	Power Source	Battery	Level	71 %	Status	Not Charging	Health	Good	Technology	Li-ion	Temperature	34.0°C	Voltage	3.932 V	Capacity (Reported by Android)	2930 mAh	 <p>The screenshot shows the AIDA64 Battery status screen on an iPhone. The status bar at the top displays the time '9:29', signal strength, '4G', and battery level. The app header is 'AIDA64 Battery'. The battery details are as follows:</p> <table><tr><td colspan="2">BATTERY</td></tr><tr><td>Status</td><td>Discharging</td></tr><tr><td>Level</td><td>36 %</td></tr><tr><td>Voltage</td><td>3.82 V</td></tr><tr><td>Capacity</td><td>2942 mAh</td></tr><tr><td>Watt hours</td><td>11.24 Wh</td></tr><tr><td>Type</td><td>Li-Ion Polymer</td></tr></table>	BATTERY		Status	Discharging	Level	36 %	Voltage	3.82 V	Capacity	2942 mAh	Watt hours	11.24 Wh	Type	Li-Ion Polymer
Power Source	Battery																														
Level	71 %																														
Status	Not Charging																														
Health	Good																														
Technology	Li-ion																														
Temperature	34.0°C																														
Voltage	3.932 V																														
Capacity (Reported by Android)	2930 mAh																														
BATTERY																															
Status	Discharging																														
Level	36 %																														
Voltage	3.82 V																														
Capacity	2942 mAh																														
Watt hours	11.24 Wh																														
Type	Li-Ion Polymer																														

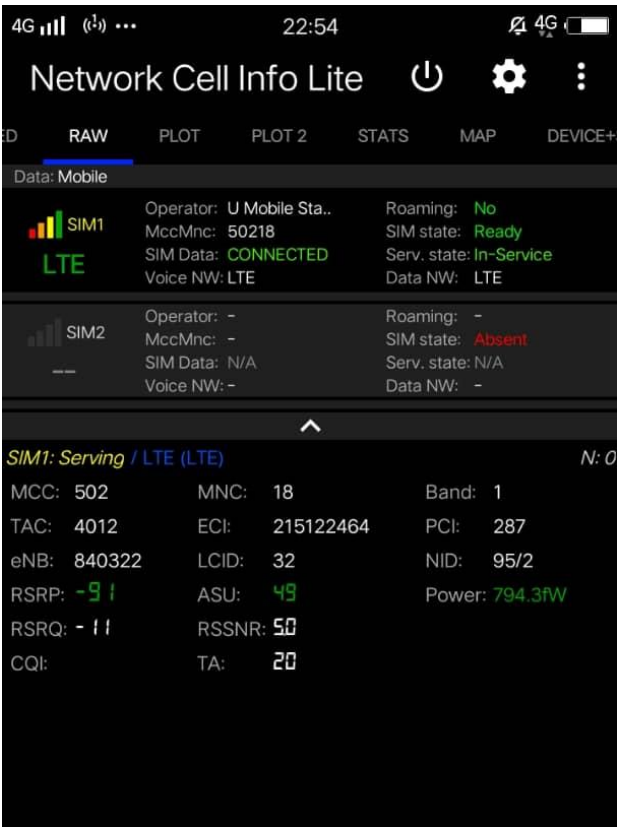
# NETWORK PROJECT

## NETWORK CELL INFO LITE(ANDROID)

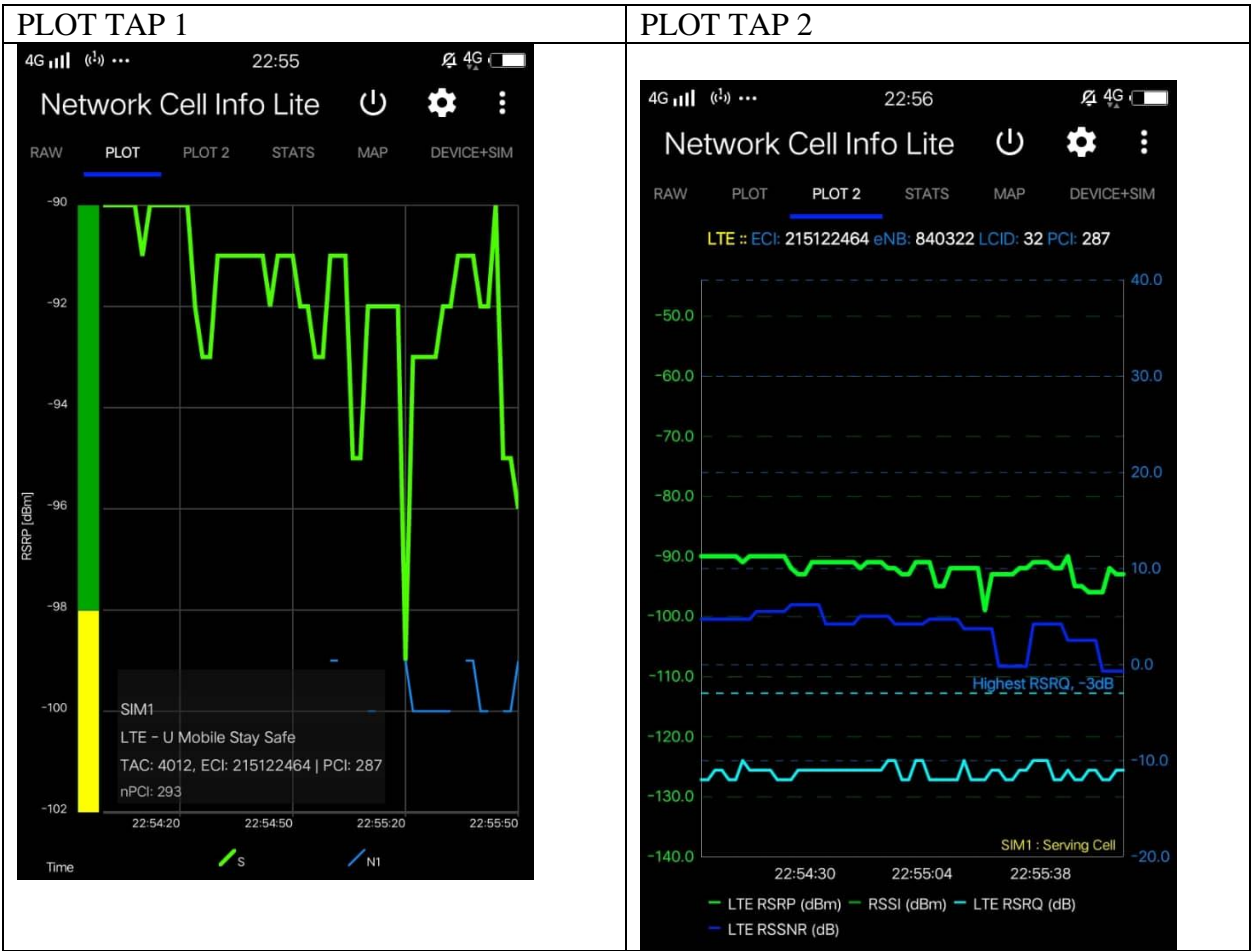
### GAUGE TAP



RAW TAP



PLOT TAP



4G (1) ... 22:56

# Network Cell Info Lite

RAW PLOT PLOT 2 **STATS** MAP DEVICE+SIM

Network connectivity statistics (%) between 2G, 3G, 4G technologies, when cell data (D) are ON, and when cell data (D) are OFF.

SIM1	4G	3G	2G	Samples
D OFF (%)	100.0	0.0	0.0	2
D ON (%)	100.0	0.0	0.0	84

Connection (%)

100  
80  
60  
40  
20  
0



4G 3G 2G

Data OFF Data ON

RESET Data OFF Data ON

Network Utility(iPhone)

9:49



Internet

ISP

Tmnet

COUNTRY

Malaysia

IP

175.138.249.69

IPv6

N/A

VIA

Wi-Fi

DNS 1


SENT

2.73 GB

RECEIVED

5.2 GB

Wi-Fi



SSID

---

BSSID

---

IP

GATEWAY

MASK

255.255.255.0

MAC

---



SENT

1,008.8 MB

RECEIVED

3.87 GB

9:56



Cellular

SSID

---

BSSID

---

IP

---

GATEWAY

---

MASK

---

MAC

---


SENT

1,010 MB

RECEIVED

3.89 GB

Cellular



CARRIER

yoodo

RAT

LTE

VoIP

YES


SENT

1.75 GB

RECEIVED

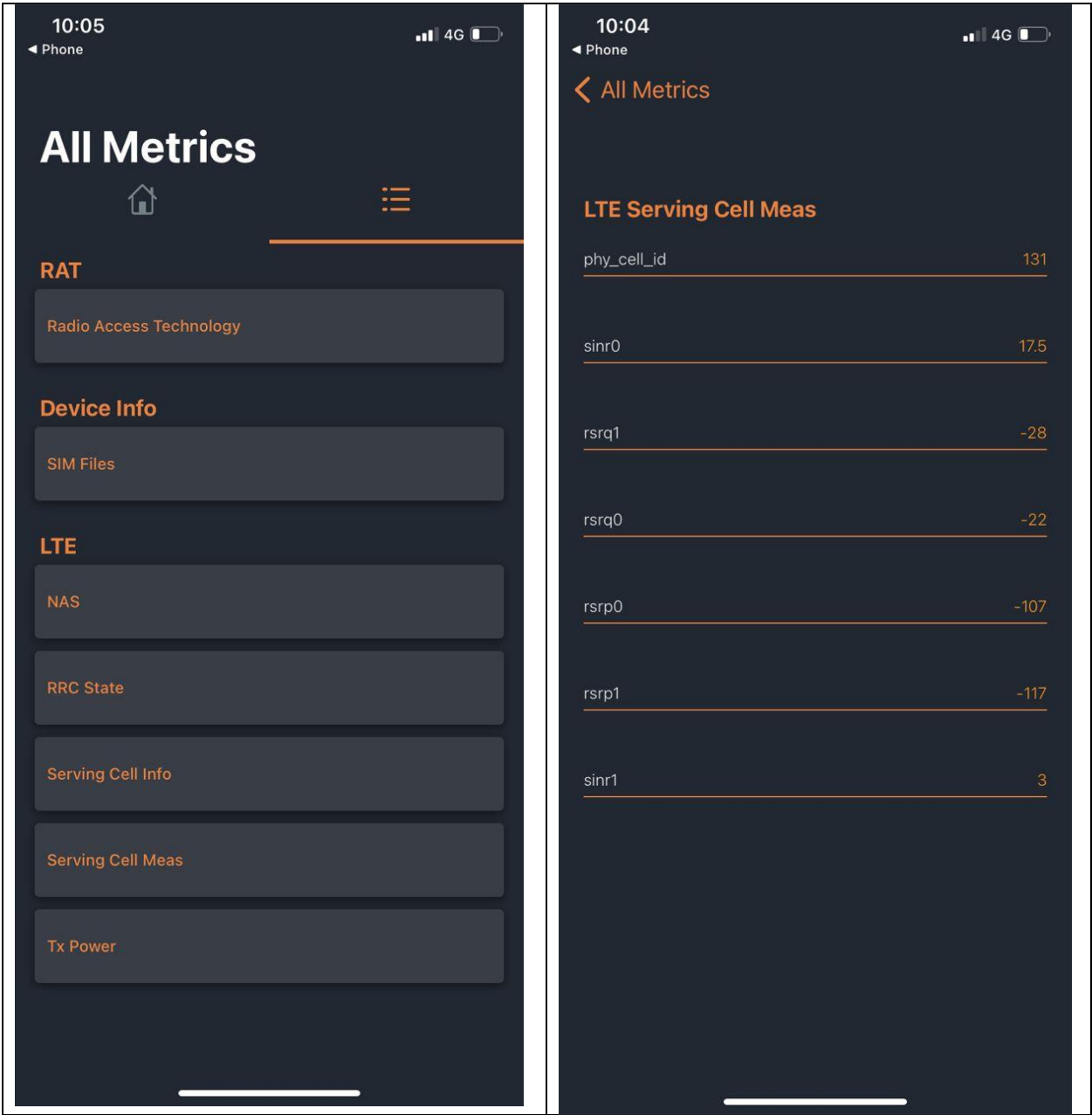
1.33 GB

Data Usage



Tap to configure

Field Test(iPhone)



## PROJECT 2: OBSERVATION ON THE NETWORK TESTING BASED ON TWO DIFFERENT SMARTPHONE

Based on project 1, the received signal strength indicator (RSSI) value will change its value depends on their Wi-Fi frequency bandwidth. If the user uses their Wi-Fi channel for 5Ghz, he can receive high bandwidth and signal but not in a longer distance but if the user use Wi-Fi channel for 2.4Ghz, they can access internet signal in a long distance due to its lower frequency bandwidth. Therefore, the relationship between distance and frequency is inversely proportional, so the distance also makes the RSSI reading change its value. The app that running on background also can give an impact to RSSI reading if the apps consume data or online app. If the user uses cellular data, the Reference Signal Received Power (RSRP) value depends on mobile network-types based on their coverage distance and places. Most place has LTE coverage because government already shutdown 2G and 3G service network (unless a few places or countries which is not developed gradually). In my experiment on the Raw tap, my smartphone actually can detect RSRP for neighboring cell but it was really poor due to coverage distance. The value for serving cell was -90dBm while for the neighboring cell was -100dBm (sometimes it disappeared). The RSRP value was quite good for RF quality but when the value almost approaching zero, the rf quality will be excellent. The LTE protocol provides a second metric, RSRQ (Reference Signal Received Quality), as the carrier power to interference power ratio: effectively, this is a signal-noise ratio evaluated with a standard signal. Even though the RSRP is low, a connection with a high RSRQ should be excellent since the modem can retrieve information from the weak signal due to little noise. For stats(statistics) tap, Radio Access Technology (RAT) majority was 4G(LTE) because it's already expanded widely nowadays.

For iPhone experiment, this smartphone can detect precisely network Maps due to its quality and RAM make network test speed work smoothly. For RSSI measure in iPhone, that was also depends on 2 channels of Wi-Fi. But for RSRP different than Android device because iPhone (that used in this experiment) baseband is Intel® XMM™ 7560, The XMM 7560 transceiver offers world-class band density—supporting more than 35 bands simultaneously in a single SKU for true global mobile coverage. With 4x4 DL-MIMO and 256QAM, it's not just fast, it's agile—benefiting both manufacturers and carriers with gigabit speeds, delivered over mixed spectrum assets for performance and efficiency. That's why iPhone still able reach 4g when the device is too far from coverage rather than Android.