

STC 700MHz & 1800MHz NB-IoT Trial Report

STC
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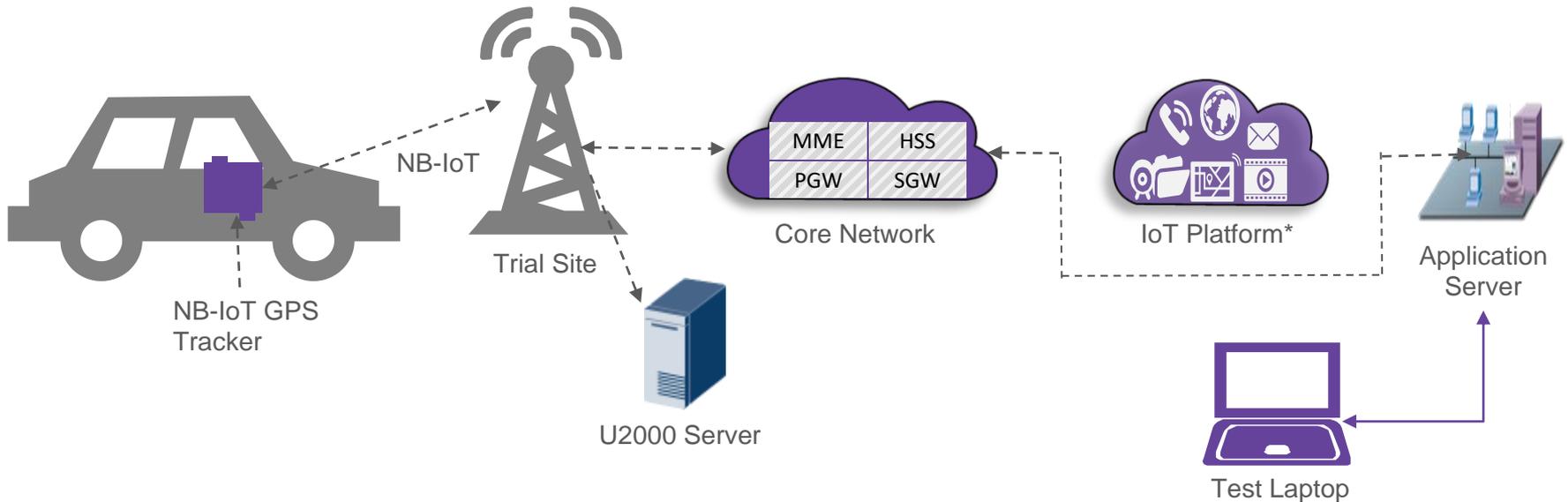
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Measurement Setup & GPS Tracker Introduction



**IoT platform is not included in this testing*

Mictrack NB-IoT GPS Tracker MP90



| Item | Description |
|-----------------|---------------------|
| Model | Quectel BG96 |
| Chipset | Qualcomm MDM9206 |
| Network Mode | B3/B28 |
| Deployment Mode | Guardband/Inband |
| Dimension | 67(L)*50(W)*25(H)mm |
| Input Voltage | 12V-24V |

**For B28 NB-IoT testing*

Mictrack NB-IoT GPS Tracker MT550



| Item | Description |
|-----------------|---------------------|
| Model | Quectel BG96 |
| Chipset | Qualcomm MDM9206 |
| Network Mode | B3/B28 |
| Deployment Mode | Guardband/Inband |
| Dimension | 94(L)*51(W)*17(H)mm |
| Input Voltage | 12V-24V |

**For B3 NB-IoT testing*

Radio Access Network – Candidate Site



Buraydah (B28)

| Site ID | Long | Lat |
|---------|-----------|-----------|
| ZBR987 | 43.893928 | 26.321760 |



Tabuk(B3)

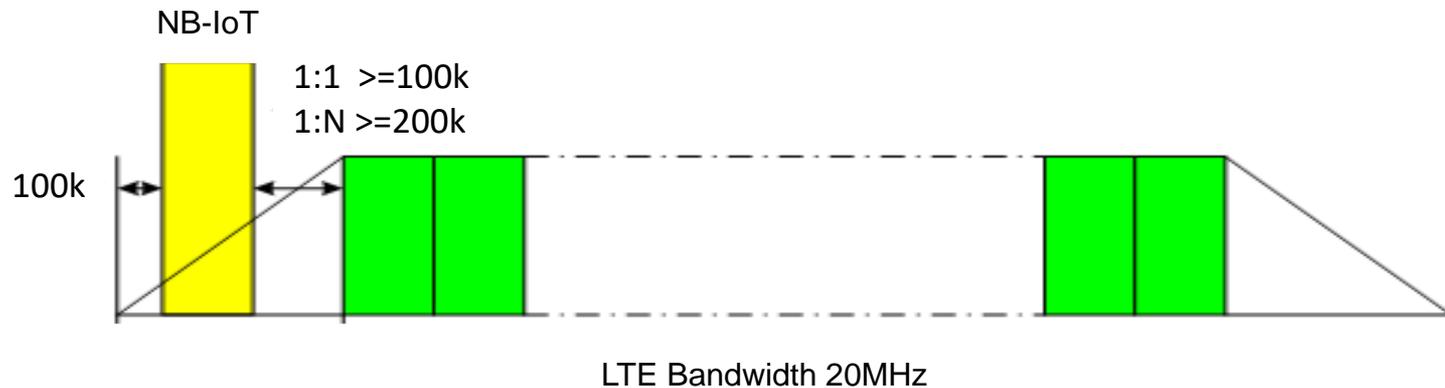
| Site ID | Long | Lat |
|---------|---------|---------|
| ZTB880 | 36.5001 | 28.4629 |

| EnodeB Name | EnodeB ID | Cell Name | Azimuth | TAC | Frequency Band | Downlink EARFCN | Reference signal power(dBm) |
|-------------|-----------|-----------|---------|-------|----------------|-----------------|-----------------------------|
| EBR987 | 64987 | XiBR987A | 20 | 13999 | 28 | 9405 | 27.2 |
| EBR987 | 64987 | XiBR987B | 130 | 13999 | 28 | 9405 | 27.2 |
| EBR987 | 64987 | XiBR987C | 240 | 13999 | 28 | 9405 | 27.2 |
| ETB880 | 53880 | EiTB880A | 90 | 13999 | 3 | 1544 | 27.2 |
| ETB880 | 53880 | EiTB880B | 190 | 13999 | 3 | 1544 | 27.2 |
| ETB880 | 53880 | EiTB880C | 300 | 13999 | 3 | 1544 | 27.2 |



NB IOT Deploy Solution - LTE Guardband

Guard band



- The guard band deployment mode can be used when the LTE bandwidth is greater than 10 MHz and guard band deployment has no legal risks.
- Guard band in edge spectrum > 100 kHz
- Guard band in edge RB > 100 kHz (1:1 network), > 100 kHz (1:N network)

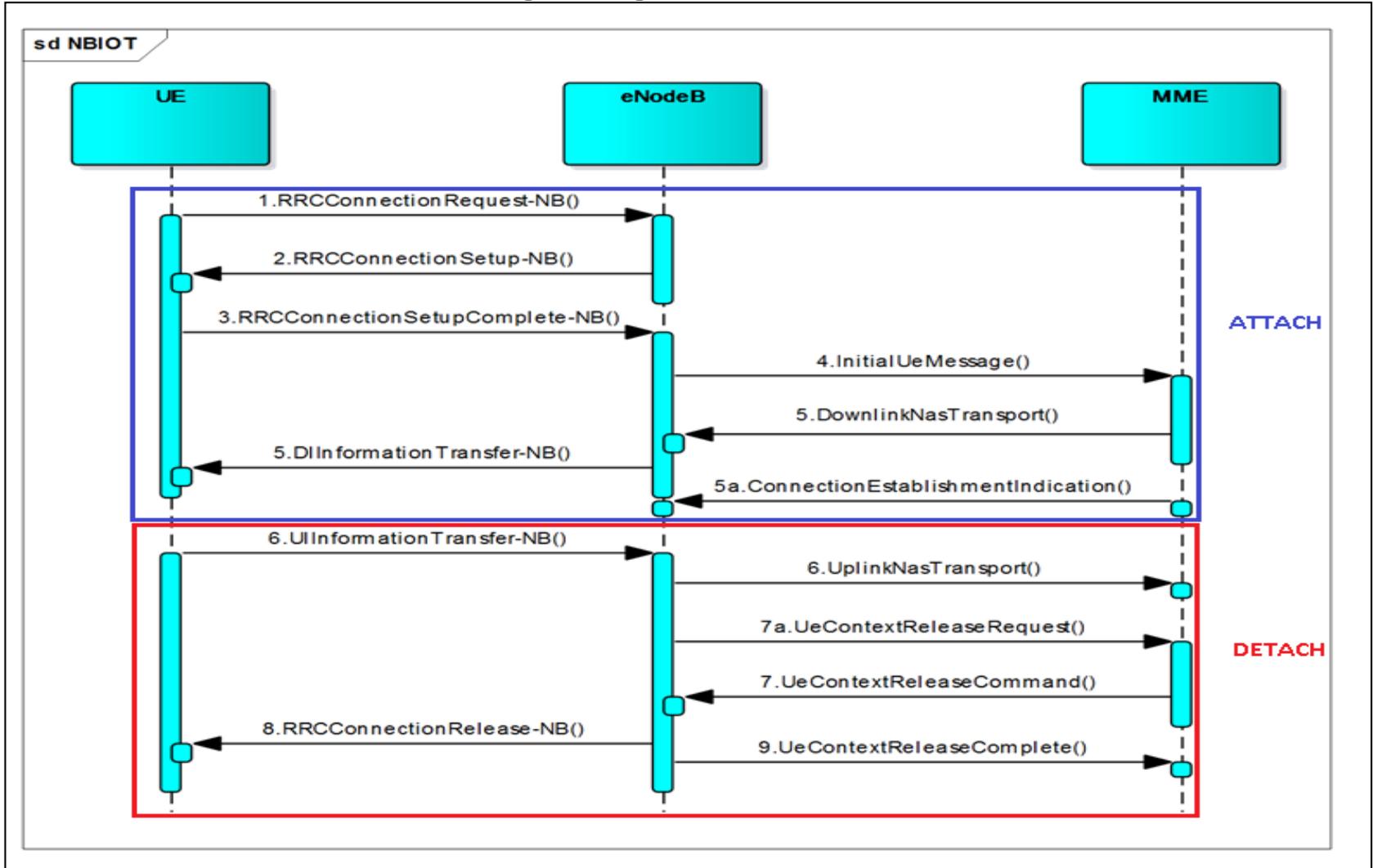


Test Case

| | Test Case | Description | Expected Result |
|---|--------------------------|--|---|
| 1 | NB-IoT signaling tracing | Test the NB-IoT device attach and detach the network successfully | Monitor the attach and detach successful message in OSS |
| 2 | GPS tracking | Test the GPS tracker can report the location information to the application website by the NB-IoT network. | Monitor the tracker location and trajectory in the application website. |

Test Case 1 NB-IoT Signaling Tracing

Signaling Flow Chart



Monitor the signaling flow message in OSS



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Signaling Tracing – Between Device and eNodeB

UU TRACE Procedure:

Use 'Signaling Trace' function from U2000 to monitor the communication between NB-IoT terminal and NB-IoT eNodeB. we can see the the RRC connection setup procedure and DL/UL transmission is successful.

| No. ^ | Time ^ | Standard Interface Message Type ^ | Message Direction ^ | Local Cell ID ^ | CPU ID ^ | Call ID ^ | PLMN ^ |
|-------|---------------------------|-----------------------------------|---------------------|-----------------|----------|-----------|--------|
| 30 | 25/04/2018 14:40:44 (515) | RRC_CONN_REQ_NB | From UE | 55 | 8390403 | 1853861 | N/A |
| 31 | 25/04/2018 14:40:44 (517) | RRC_CONN_SETUP_NB | To UE | 55 | 8390403 | 1853861 | N/A |
| 32 | 25/04/2018 14:40:44 (610) | RRC_CONN_SETUP_CMP_NB | From UE | 55 | 8390403 | 1853861 | N/A |
| 33 | 25/04/2018 14:40:44 (863) | RRC_DL_INFO_TRANSF_NB | To UE | 55 | 8390403 | 1853861 | 42001 |
| 34 | 25/04/2018 14:40:45 (176) | RRC_UL_INFO_TRANSF_NB | From UE | 55 | 8390403 | 1853861 | 42001 |
| 35 | 25/04/2018 14:40:45 (193) | RRC_DL_INFO_TRANSF_NB | To UE | 55 | 8390403 | 1853861 | 42001 |
| 36 | 25/04/2018 14:40:45 (828) | RRC_UL_INFO_TRANSF_NB | From UE | 55 | 8390403 | 1853861 | 42001 |
| 37 | 25/04/2018 14:40:45 (840) | RRC_DL_INFO_TRANSF_NB | To UE | 55 | 8390403 | 1853861 | 42001 |
| 38 | 25/04/2018 14:40:45 (923) | RRC_UL_INFO_TRANSF_NB | From UE | 55 | 8390403 | 1853861 | 42001 |
| 39 | 25/04/2018 14:40:45 (951) | RRC_DL_INFO_TRANSF_NB | To UE | 55 | 8390403 | 1853861 | 42001 |
| 40 | 25/04/2018 14:40:46 (499) | RRC_UL_INFO_TRANSF_NB | From UE | 55 | 8390403 | 1853861 | 42001 |
| 41 | 25/04/2018 14:40:46 (653) | RRC_DL_INFO_TRANSF_NB | To UE | 55 | 8390403 | 1853861 | 42001 |
| 42 | 25/04/2018 14:40:46 (782) | RRC_UL_INFO_TRANSF_NB | From UE | 55 | 8390403 | 1853861 | 42001 |
| 43 | 25/04/2018 14:40:57 (357) | RRC_UL_INFO_TRANSF_NB | From UE | 55 | 8390403 | 1853861 | 42001 |
| 44 | 25/04/2018 14:40:57 (377) | RRC_DL_INFO_TRANSF_NB | To UE | 55 | 8390403 | 1853861 | 42001 |
| 45 | 25/04/2018 14:40:57 (431) | RRC_UL_INFO_TRANSF_NB | From UE | 55 | 8390403 | 1853861 | 42001 |
| 46 | 25/04/2018 14:40:57 (444) | RRC_CONN_REL_NB | To UE | 55 | 8390403 | 1853861 | 42001 |
| 47 | 25/04/2018 14:41:07 (564) | RRC_CONN_REQ_NB | From UE | 55 | 8390403 | 1853875 | N/A |
| 48 | 25/04/2018 14:41:07 (566) | RRC_CONN_SETUP_NB | To UE | 55 | 8390403 | 1853875 | N/A |
| 49 | 25/04/2018 14:41:07 (644) | RRC_CONN_SETUP_CMP_NB | From UE | 55 | 8390403 | 1853875 | N/A |
| 50 | 25/04/2018 14:41:07 (662) | RRC_DL_INFO_TRANSF_NB | To UE | 55 | 8390403 | 1853875 | 42001 |
| 51 | 25/04/2018 14:41:07 (723) | RRC_UL_INFO_TRANSF_NB | From UE | 55 | 8390403 | 1853875 | 42001 |
| 52 | 25/04/2018 14:41:07 (738) | RRC_CONN_REL_NB | To UE | 55 | 8390403 | 1853875 | 42001 |
| 53 | 25/04/2018 14:41:18 (437) | RRC_CONN_REQ_NB | From UE | 55 | 8390403 | 1853885 | N/A |
| 54 | 25/04/2018 14:41:18 (438) | RRC_CONN_SETUP_NB | To UE | 55 | 8390403 | 1853885 | N/A |

No. 30, Total: 543, Selected

26/04/2018 17:13:21: System loaded successfully.



Signaling Tracing - Between eNodeB and MME (1) Attach

MME TRACE Procedure (Attach):

From the MME trace, we can see the attach procedure and communication between UE/eNodeB/MME are successful.

| No. | Mess... | TimeStamp | Milli... | Rack:Slot... | Message Direction | Message... | Message Type | IMS/IMEI | Mess... | Message Content |
|------|---------|---------------------|----------|--------------|-------------------|------------|------------------------------------|-----------------|---------|--------------------------------------|
| 1042 | 1042 | 2018-04-25 14:40:23 | 182 | 1:8:SGP:2 | S1AP -> MM | Internal | UE CONTEXT RELEASE CMP | 420013302635636 | 374 | E9 00 00 16 0C 01 00 00 79 00 00 ... |
| 1043 | 1043 | 2018-04-25 14:40:44 | 804 | 1:2:SPP:4 | S1AP -> MM | Internal | S1AP_SPU_INIT_UE_MSG | 420013302635636 | 164 | E9 00 00 16 0C 01 00 00 79 00 00 ... |
| 1044 | 1044 | 2018-04-25 14:40:44 | 804 | 1:2:SPP:4 | UE -> MME | Protocol | Attach Request | 420013302635636 | 48 | 07 41 72 0B F6 24 F0 10 80 01 20 ... |
| 1045 | 1045 | 2018-04-25 14:40:44 | 804 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 132 | 79 00 00 15 04 00 00 00 79 00 00 ... |
| 1046 | 1046 | 2018-04-25 14:40:44 | 805 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 77 | 79 00 00 15 00 00 00 00 79 00 00 ... |
| 1047 | 1047 | 2018-04-25 14:40:44 | 805 | 1:2:SPP:4 | MM -> S1AP | Internal | SPU_S1AP_RETURN_MM_CONN_INDEX | 420013302635636 | 74 | 79 00 00 15 E4 00 00 00 E9 00 00 ... |
| 1048 | 1048 | 2018-04-25 14:40:44 | 805 | 1:2:SPP:4 | MMECB | Internal | MM_CB | 420013302635636 | 4510 | 24 00 31 03 62 53 36 F6 68 46 52 ... |
| 1049 | 1049 | 2018-04-25 14:40:44 | 805 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_STATIC | 420013302635636 | 1064 | 01 00 FF FF 30 E4 00 00 71 10 00 ... |
| 1050 | 1050 | 2018-04-25 14:40:44 | 805 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_DYNAMIC | 420013302635636 | 1212 | 02 00 FF FF 30 E4 00 00 71 10 00 ... |
| 1051 | 1051 | 2018-04-25 14:40:44 | 805 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 72 | 79 00 00 15 00 00 00 00 79 00 00 ... |
| 1052 | 1052 | 2018-04-25 14:40:44 | 805 | 1:2:SPP:4 | MM -> UDM | Internal | MM_UDM_AUTH_INFO_REQ | 420013302635636 | 155 | 79 00 00 15 E4 00 00 00 79 00 00 ... |
| 1053 | 1053 | 2018-04-25 14:40:44 | 805 | 1:2:SPP:4 | MMECB | Internal | MM_CB | 420013302635636 | 4510 | 24 00 31 03 62 53 36 F6 FF FF FF ... |
| 1054 | 1054 | 2018-04-25 14:40:44 | 805 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_STATIC | 420013302635636 | 1064 | 01 00 FF FF 30 E4 00 00 71 10 00 ... |
| 1055 | 1055 | 2018-04-25 14:40:44 | 805 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_DYNAMIC | 420013302635636 | 1212 | 02 00 FF FF 30 E4 00 00 71 10 00 ... |
| 1056 | 1056 | 2018-04-25 14:40:44 | 806 | 1:2:SPP:4 | UDM -> MM | Internal | UDM_MM_RETURN_INDEX | 420013302635636 | 65 | 79 00 00 15 0D 01 00 00 79 00 00 ... |
| 1057 | 1057 | 2018-04-25 14:40:44 | 806 | 1:2:SPP:4 | UDMSP->UDMCM | Internal | UDMSP_UDMCM_AUTH_INFO_REQ | 420013302635636 | 143 | 79 00 00 15 FF 1F 00 00 79 00 00 ... |
| 1058 | 1058 | 2018-04-25 14:40:44 | 806 | 1:2:SPP:4 | UDM->DIAM | Internal | UDM_DIAM_AUTH_INFO_REQ | 420013302635636 | 4228 | 79 00 00 15 0D 01 00 00 79 00 00 ... |
| 1059 | 1059 | 2018-04-25 14:40:44 | 806 | 1:2:SPP:4 | MME(SGSN) -> HSS | Protocol | Authentication Information Request | 420013302635636 | 420 | 01 00 01 A4 C0 00 01 3E 01 00 00 ... |
| 1060 | 1060 | 2018-04-25 14:40:44 | 807 | 1:2:SPP:4 | DIAM-PROC-TRC | Internal | DIAM_PROC_TRC | 420013302635636 | 114 | 02 A0 00 00 6A 00 00 00 69 41 44 ... |
| 1061 | 1061 | 2018-04-25 14:40:45 | 32 | 1:2:SPP:4 | HSS -> MME(SGSN) | Protocol | Authentication Information Answer | 420013302635636 | 384 | 01 00 01 80 40 00 01 3E 01 00 00 ... |
| 1062 | 1062 | 2018-04-25 14:40:45 | 33 | 1:2:SPP:4 | DIAM->UDM | Internal | DIAM_UDM_AUTH_INFO_RSP | 420013302635636 | 312 | 79 00 00 15 0E 01 00 00 79 00 00 ... |
| 1063 | 1063 | 2018-04-25 14:40:45 | 33 | 1:2:SPP:4 | UDMCM->UDMSP | Internal | UDMCM_UDMSP_AUTH_INFO_RSP | 420013302635636 | 1312 | 79 00 00 15 FF 2F 00 00 79 00 00 ... |
| 1064 | 1064 | 2018-04-25 14:40:45 | 33 | 1:2:SPP:4 | UDM -> MM | Internal | UDM_MM_AUTH_INFO_RSP | 420013302635636 | 80 | 79 00 00 15 0D 01 00 00 79 00 00 ... |
| 1065 | 1065 | 2018-04-25 14:40:45 | 34 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 84 | 79 00 00 15 06 00 00 00 79 00 00 ... |
| 1066 | 1066 | 2018-04-25 14:40:45 | 34 | 1:2:SPP:4 | MME -> UE | Protocol | Authentication Request | 420013302635636 | 36 | 07 52 01 37 61 77 51 B0 9B 0F B8 ... |
| 1067 | 1067 | 2018-04-25 14:40:45 | 34 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 120 | 79 00 00 15 00 00 00 00 79 00 00 ... |
| 1068 | 1068 | 2018-04-25 14:40:45 | 34 | 1:2:SPP:4 | MM -> S1AP | Internal | SPU_S1AP_DOWNLINK_NAS_TRANSPORT | 420013302635636 | 123 | 79 00 00 15 E4 00 00 00 E9 00 00 ... |
| 1069 | 1069 | 2018-04-25 14:40:45 | 34 | 1:2:SPP:4 | MMECB | Internal | MM_CB | 420013302635636 | 4510 | 24 00 31 03 62 53 36 F6 FF FF FF ... |
| 1070 | 1070 | 2018-04-25 14:40:45 | 34 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_STATIC | 420013302635636 | 1064 | 01 00 FF FF 30 E4 00 00 71 10 00 ... |
| 1071 | 1071 | 2018-04-25 14:40:45 | 34 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_DYNAMIC | 420013302635636 | 1212 | 02 00 FF FF 30 E4 00 00 71 10 00 ... |
| 1072 | 1072 | 2018-04-25 14:40:44 | 960 | 1:8:SGP:2 | MME -> eNodeB | Protocol | DOWNLINK NAS TRANSPORT | 420013302635636 | 161 | E9 00 00 16 0C 01 00 00 E9 00 00 ... |
| 1073 | 1073 | 2018-04-25 14:40:44 | 960 | 1:8:SGP:2 | S1APADP -> SCTP | Internal | DOWNLINK_NAS_TRANSPORT | 420013302635636 | 161 | E9 00 00 16 0C 01 00 00 E9 00 00 ... |
| 1074 | 1074 | 2018-04-25 14:40:45 | 358 | 1:2:SPP:4 | S1AP -> MM | Internal | S1AP_SPU_UPLINK_NAS_TRANSPORT | 420013302635636 | 92 | E9 00 00 16 0C 01 00 00 E9 00 00 ... |
| 1075 | 1075 | 2018-04-25 14:40:45 | 282 | 1:8:SGP:2 | SCTP -> S1APADP | Internal | UPLINK NAS TRANSPORT | 420013302635636 | 158 | E9 00 00 16 F5 00 00 00 E9 00 00 ... |
| 1076 | 1076 | 2018-04-25 14:40:45 | 358 | 1:2:SPP:4 | UE -> MME | Protocol | Authentication Response | 420013302635636 | 111 | 07 53 08 C6 1B 91 3E 78 39 75 7C ... |
| 1077 | 1077 | 2018-04-25 14:40:45 | 358 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 95 | 79 00 00 15 04 00 00 00 79 00 00 ... |

| No. | Mess... | TimeStamp | Milli... | Rack:Slot... | Message Direction | Message... | Message Type | IMS/IMEI | Mess... | Message Content |
|------|---------|---------------------|----------|--------------|-------------------|------------|---------------------------------|-----------------|---------|--------------------------------------|
| 1214 | 1214 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 52 | 79 00 00 15 00 00 00 00 79 00 00 ... |
| 1215 | 1215 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 68 | 79 00 00 15 08 00 00 00 79 00 00 ... |
| 1216 | 1216 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MME -> UE | Protocol | Attach Accept | 420013302635636 | 135 | 07 42 01 49 06 04 24 F0 10 36 AF ... |
| 1217 | 1217 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 225 | 79 00 00 15 00 00 00 00 79 00 00 ... |
| 1218 | 1218 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MM -> S1AP | Internal | SPU_S1AP_DOWNLINK_NAS_TRANSPORT | 420013302635636 | 228 | 79 00 00 15 E4 00 00 00 E9 00 00 ... |
| 1219 | 1219 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MMECB | Internal | MM_CB | 420013302635636 | 4510 | 24 00 31 03 62 53 36 F6 68 46 52 ... |
| 1220 | 1220 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_STATIC | 420013302635636 | 1064 | 01 00 FF FF 30 E4 00 00 71 10 00 ... |
| 1221 | 1221 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_DYNAMIC | 420013302635636 | 1212 | 02 00 FF FF 30 E4 00 00 71 10 00 ... |
| 1222 | 1222 | 2018-04-25 14:40:46 | 738 | 1:8:SGP:2 | MME -> eNodeB | Protocol | DOWNLINK NAS TRANSPORT | 420013302635636 | 269 | E9 00 00 16 0C 01 00 00 E9 00 00 ... |
| 1223 | 1223 | 2018-04-25 14:40:46 | 738 | 1:8:SGP:2 | S1APADP -> SCTP | Internal | DOWNLINK_NAS_TRANSPORT | 420013302635636 | 269 | E9 00 00 16 0C 01 00 00 E9 00 00 ... |
| 1224 | 1224 | 2018-04-25 14:40:46 | 879 | 1:8:SGP:2 | SCTP -> S1APADP | Internal | UPLINK NAS TRANSPORT | 420013302635636 | 160 | E9 00 00 16 F5 00 00 00 E9 00 00 ... |
| 1225 | 1225 | 2018-04-25 14:40:46 | 879 | 1:8:SGP:2 | S1APADP -> S1AP | Internal | UPLINK_NAS_TRANSPORT | 420013302635636 | 160 | E9 00 00 16 0B 01 00 00 E9 00 00 ... |
| 1226 | 1226 | 2018-04-25 14:40:46 | 879 | 1:8:SGP:2 | eNodeB -> MME | Protocol | UPLINK NAS TRANSPORT | 420013302635636 | 160 | E9 00 00 16 0B 01 00 00 E9 00 00 ... |
| 1227 | 1227 | 2018-04-25 14:40:46 | 879 | 1:8:SGP:2 | S1AP -> MM | Internal | UPLINK NAS TRANSPORT | 420013302635636 | 94 | E9 00 00 16 0C 01 00 00 79 00 00 ... |
| 1228 | 1228 | 2018-04-25 14:40:46 | 955 | 1:2:SPP:4 | S1AP -> MM | Internal | S1AP_SPU_UPLINK_NAS_TRANSPORT | 420013302635636 | 94 | E9 00 00 16 0C 01 00 00 79 00 00 ... |
| 1229 | 1229 | 2018-04-25 14:40:46 | 956 | 1:2:SPP:4 | UE -> MME | Protocol | Attach Complete | 420013302635636 | 13 | 27 A9 5D F8 F8 03 07 43 00 03 52 ... |
| 1230 | 1230 | 2018-04-25 14:40:46 | 956 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 97 | 79 00 00 15 04 00 00 00 79 00 00 ... |
| 1231 | 1231 | 2018-04-25 14:40:46 | 956 | 1:2:SPP:4 | MM -> SM | Internal | MM_SM_FWD_L3_MSG | 420013302635636 | 145 | 79 00 00 15 E4 00 00 00 79 00 00 ... |

Signaling Tracing - Between eNodeB and MME (2) Attach Parameter Checking

NB-IoT Parameter Checking:

From the MME trace, we can see the MME will send attach accept message to UE, message include the TAC(13999),QCI(9),APN(jawalnet.com.sa),PLMN(42001),

The image shows a signaling trace and a detailed view of an Attach Accept message. The trace table on the left shows the sequence of messages between the MME and the UE. The message browser on the right details the parameters of the Attach Accept message, with red boxes and arrows highlighting specific values: TAC (13999), NB-IoT QCI (9), APN (jawalnet.com.sa), and PLMN (MNC001 MCC420).

| No. | Mess... | TimeStamp | Milli... | Rack:Slot... | Message Direction | Messag... | Message Type |
|------|---------|---------------------|----------|--------------|-------------------|-----------|---------------------------|
| 1208 | 1208 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | SM-PROC-TRC | Internal | SM_PROC_TRC |
| 1209 | 1209 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | SM -> MM | Internal | SM_MM_CTRL_CREATE_DEFAULT |
| 1210 | 1210 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | SM-USER-CB-SDB | Internal | SM_USER_CB_SDB |
| 1211 | 1211 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | SM-MPDP-CB-SDB | Internal | SM_MPDP_CB_SDB |
| 1212 | 1212 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | SM-PDP-CB-SDB | Internal | SM_PDP_CB_SDB |
| 1213 | 1213 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL |
| 1214 | 1214 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL |
| 1215 | 1215 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL |
| 1216 | 1216 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MME -> UE | Protocol | Attach Accept |
| 1217 | 1217 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL |
| 1218 | 1218 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MM -> S1AP | Internal | SPU_S1AP_DOWNLINK_NAS_TR |
| 1219 | 1219 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MNCB | Internal | MM_CB |
| 1220 | 1220 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_STATIC |
| 1221 | 1221 | 2018-04-25 14:40:46 | 812 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_DYNAMIC |
| 1222 | 1222 | 2018-04-25 14:40:46 | 738 | 1:8:SGP:2 | MME -> eNodeB | Protocol | DOWNLINK NAS TRANSPORT |
| 1223 | 1223 | 2018-04-25 14:40:46 | 738 | 1:8:SGP:2 | S1APADP -> SCTP | Internal | DOWNLINK_NAS_TRANSPORT |
| 1224 | 1224 | 2018-04-25 14:40:46 | 879 | 1:8:SGP:2 | SCTP -> S1APADP | Internal | UPLINK NAS TRANSPORT |
| 1225 | 1225 | 2018-04-25 14:40:46 | 879 | 1:8:SGP:2 | S1APADP -> S1AP | Internal | UPLINK_NAS_TRANSPORT |
| 1226 | 1226 | 2018-04-25 14:40:46 | 879 | 1:8:SGP:2 | eNodeB -> MME | Protocol | UPLINK NAS TRANSPORT |
| 1227 | 1227 | 2018-04-25 14:40:46 | 879 | 1:8:SGP:2 | S1AP -> MM | Internal | UPLINK NAS TRANSPORT |
| 1228 | 1228 | 2018-04-25 14:40:46 | 955 | 1:2:SPP:4 | S1AP -> MM | Internal | S1AP_SPU_UPLINK_NAS_TRANS |
| 1229 | 1229 | 2018-04-25 14:40:46 | 956 | 1:2:SPP:4 | UE -> MME | Protocol | Attach Complete |
| 1230 | 1230 | 2018-04-25 14:40:46 | 956 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL |
| 1231 | 1231 | 2018-04-25 14:40:46 | 956 | 1:2:SPP:4 | MM -> SM | Internal | MM_SM_FWD_L3_MSG |
| 1232 | 1232 | 2018-04-25 14:40:46 | 956 | 1:2:SPP:4 | MNCB | Internal | MM_CB |
| 1233 | 1233 | 2018-04-25 14:40:46 | 956 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_STATIC |
| 1234 | 1234 | 2018-04-25 14:40:46 | 956 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_DYNAMIC |
| 1235 | 1235 | 2018-04-25 14:40:46 | 956 | 1:2:SPP:4 | MM -> S1AP | Internal | SPU_S1AP_CHANGE_MM_CONN |
| 1236 | 1236 | 2018-04-25 14:40:46 | 957 | 1:2:SPP:4 | MNCB | Internal | MM_CB |
| 1237 | 1237 | 2018-04-25 14:40:46 | 957 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_STATIC |
| 1238 | 1238 | 2018-04-25 14:40:46 | 957 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_DYNAMIC |

Message Browser-1216-[AttachAccept]

- partial-tracking-area-identity-list
 - tAC-and-mcc-mnc
 - mcc-mnc:24 F0 10
 - tac:0x36af (13999) **TAC**
 - other-tAC-and-mcc-mnc
- eSM-message-container
- no-security-protection-SM-message
 - ePS-bearer-identity:0x5 (5)
 - procedure-transaction-identity:0x1 (1)
- msg-body
 - activateDefaultEPSBearerContextRequest
 - ePS-QoS
 - qCI:0x9 (9) **NB-IoT QCI**
 - access-point-name
 - CHARACTER-STRING:jawalnet **APN**
 - CHARACTER-STRING:com
 - CHARACTER-STRING:sa
 - CHARACTER-STRING:MNC001 **PLMN**
 - CHARACTER-STRING:MCC420
 - CHARACTER-STRING:GPRS



Signaling Tracing - Between eNodeB and MME (3) Detach

MME TRACE Procedure (Detach):

From the MME trace, we can see the detach successful.

| No. ^ | Mess... ^ | TimeStamp ^ | Milli... ^ | Rack/Slot... ^ | Message Direction ^ | Message... ^ | Message Type ^ | IMS/IMEI ^ | Mess... ^ | Message Content |
|-------|-----------|---------------------|------------|----------------|---------------------|--------------|---------------------------------|-----------------|-----------|--------------------------------------|
| 1307 | 1307 | 2018-04-25 14:40:57 | 533 | 1:8:SGP:2 | S1AP -> MM | Internal | UPLINK NAS TRANSPORT | 420013302635636 | 89 | E9 00 00 16 0C 01 00 00 79 00 00... |
| 1308 | 1308 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | S1AP -> MM | Internal | S1AP_SPU_UPLINK_NAS_TRANSPORT | 420013302635636 | 89 | E9 00 00 16 0C 01 00 00 79 00 00... |
| 1309 | 1309 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | UE -> MME | Protocol | Tracking Area Update Complete | 420013302635636 | 8 | 27 0C 3C 29 A7 05 07 4A |
| 1310 | 1310 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 92 | 79 00 00 15 04 00 00 00 79 00 00 ... |
| 1311 | 1311 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | MM -> SM | Internal | MM_SM_CTRL_SUB_DATA_NOTIFY | 420013302635636 | 81 | 79 00 00 15 E4 00 00 00 79 00 00 ... |
| 1312 | 1312 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | MMSDB | Internal | MM_CB | 420013302635636 | 4510 | 24 00 31 03 62 53 36 F6 68 46 52 ... |
| 1313 | 1313 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_STATIC | 420013302635636 | 1064 | 01 00 FF FF 30 E4 00 00 71 10 00 ... |
| 1314 | 1314 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_DYNAMIC | 420013302635636 | 1212 | 02 00 FF FF 30 E4 00 00 71 10 00 ... |
| 1315 | 1315 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 80 | 79 00 00 15 00 00 00 00 79 00 00 ... |
| 1316 | 1316 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | MM -> S1AP | Internal | SPU_S1AP_UE_CONTEXT_RELEASE_CMD | 420013302635636 | 69 | 79 00 00 15 E4 00 00 00 E9 00 00... |
| 1317 | 1317 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | MMSDB | Internal | MM_CB | 420013302635636 | 4510 | 24 00 31 03 62 53 36 F6 68 46 52 ... |
| 1318 | 1318 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_STATIC | 420013302635636 | 1064 | 01 00 FF FF 30 E4 00 00 71 10 00 ... |
| 1319 | 1319 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_DYNAMIC | 420013302635636 | 1212 | 02 00 FF FF 30 E4 00 00 71 10 00 ... |
| 1320 | 1320 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | MM-EMS | Maintenan... | EMS_SIGNALING_NORMAL | 420013302635636 | 338 | 00 00 00 00 00 00 00 00 00 00 00 ... |
| 1321 | 1321 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | SM-USER-CB-SDB | Internal | SM_USER_CB_SDB | 420013302635636 | 3360 | 01 0D 03 00 01 05 2F FF 00 68 C6... |
| 1322 | 1322 | 2018-04-25 14:40:57 | 609 | 1:2:SPP:4 | SM-MPDP-CB-SDB | Internal | SM_MPDP_CB_SDB | 420013302635636 | 7847 | 02 0D 03 00 01 01 01 FF 00 00 00... |
| 1323 | 1323 | 2018-04-25 14:40:57 | 610 | 1:2:SPP:4 | SM-PDP-CB-SDB | Internal | SM_PDP_CB_SDB | 420013302635636 | 2350 | 03 0D 03 00 01 01 01 FF 00 00 00... |
| 1324 | 1324 | 2018-04-25 14:40:57 | 610 | 1:2:SPP:4 | SM-PROC-TRC | Internal | SM_PROC_TRC | 420013302635636 | 113 | 10 0D 00 00 69 00 00 00 68 5B 4E... |
| 1325 | 1325 | 2018-04-25 14:40:57 | 610 | 1:2:SPP:4 | SM-PROC-TRC | Internal | SM_PROC_TRC | 420013302635636 | 582 | 10 0D 00 00 3E 02 00 00 30 53 6... |
| 1326 | 1326 | 2018-04-25 14:40:57 | 610 | 1:2:SPP:4 | SM-PROC-TRC | Internal | SM_PROC_TRC | 420013302635636 | 201 | 10 0D 00 00 C1 00 00 00 30 53 6... |
| 1327 | 1327 | 2018-04-25 14:40:57 | 610 | 1:2:SPP:4 | SM-PROC-TRC | Internal | SM_PROC_TRC | 420013302635636 | 323 | 10 0D 00 00 3B 01 00 00 1F 53 6... |
| 1328 | 1328 | 2018-04-25 14:40:57 | 610 | 1:2:SPP:4 | SM-PROC-TRC | Internal | SM_PROC_TRC | 420013302635636 | 171 | 10 0D 00 00 A3 00 00 00 2B 53 6... |
| 1329 | 1329 | 2018-04-25 14:40:57 | 610 | 1:2:SPP:4 | SM-PROC-TRC | Internal | SM_PROC_TRC | 420013302635636 | 126 | 10 0D 00 00 76 00 00 00 2D 70 73... |
| 1330 | 1330 | 2018-04-25 14:40:57 | 610 | 1:2:SPP:4 | SM-PROC-TRC | Internal | SM_PROC_TRC | 420013302635636 | 359 | 10 0D 00 00 5F 01 00 00 2B 53 6... |
| 1331 | 1331 | 2018-04-25 14:40:57 | 536 | 1:8:SGP:2 | MME -> eNodeB | Protocol | UE CONTEXT RELEASE COMMAND | 420013302635636 | 121 | E9 00 00 16 0C 01 00 00 E9 00 00... |
| 1332 | 1332 | 2018-04-25 14:40:57 | 536 | 1:8:SGP:2 | S1APADP -> SCTP | Internal | UE_CONTEXT_REL_COMMAND | 420013302635636 | 121 | E9 00 00 16 0C 01 00 00 E9 00 00... |
| 1333 | 1333 | 2018-04-25 14:40:58 | 64 | 1:8:SGP:2 | SCTP -> S1APADP | Internal | UE CONTEXT RELEASE COMPLETE | 420013302635636 | 165 | E9 00 00 16 F5 00 00 00 E9 00 00... |
| 1334 | 1334 | 2018-04-25 14:40:58 | 64 | 1:8:SGP:2 | S1APADP -> S1AP | Internal | UE_CONTEXT_REL_COMPLETE | 420013302635636 | 165 | E9 00 00 16 0B 01 00 00 E9 00 00... |
| 1335 | 1335 | 2018-04-25 14:40:58 | 64 | 1:8:SGP:2 | eNodeB -> MME | Protocol | UE CONTEXT RELEASE COMPLETE | 420013302635636 | 165 | E9 00 00 16 0B 01 00 00 E9 00 00... |
| 1336 | 1336 | 2018-04-25 14:40:58 | 64 | 1:8:SGP:2 | S1AP -> MM | Internal | UE CONTEXT RELEASE CMP | 420013302635636 | 374 | E9 00 00 16 0C 01 00 00 79 00 00... |
| 1337 | 1337 | 2018-04-25 14:40:58 | 139 | 1:2:SPP:4 | S1AP -> MM | Internal | S1AP_SPU_UE_CONTEXT_RELEASE_CMP | 420013302635636 | 374 | E9 00 00 16 0C 01 00 00 79 00 00... |
| 1338 | 1338 | 2018-04-25 14:40:58 | 140 | 1:2:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 80 | 79 00 00 15 04 00 00 00 79 00 00 ... |
| 1339 | 1339 | 2018-04-25 14:40:58 | 140 | 1:2:SPP:4 | MM -> SM | Internal | MM_SM_CTRL_REL_CONN_NOTIFY | 420013302635636 | 84 | 79 00 00 15 E4 00 00 00 79 00 00 ... |
| 1340 | 1340 | 2018-04-25 14:40:58 | 140 | 1:2:SPP:4 | MMSDB | Internal | MM_CB | 420013302635636 | 4510 | 24 00 31 03 62 53 36 F6 68 46 52 ... |
| 1341 | 1341 | 2018-04-25 14:40:58 | 140 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_STATIC | 420013302635636 | 1064 | 01 00 FF FF 30 E4 00 00 71 10 00 ... |
| 1342 | 1342 | 2018-04-25 14:40:58 | 140 | 1:2:SPP:4 | MMSDB | Internal | MM_SDB_DYNAMIC | 420013302635636 | 1212 | 02 00 FF FF 30 E4 00 00 71 10 00 ... |

GPS Tracking - Real Time Tracking

Real Time Tracking:

When GPS Tracking device is debugged setup on Band28 and switch ON, it will connect to the network and from the tracing server car location and position can be identified.

The screenshot displays a web-based GPS tracking interface. At the top, there is a navigation bar with the 'GPS' logo, the user name 'Huawei', and several menu icons: 'Monitor', 'Statistics', 'Device', and 'Recharge'. The user is logged in as 'Hello! Huawei' and has options to 'Change Password' or 'My Service'.

The main interface shows a map of Saudi Arabia, specifically the area around Diras, Buraydah. The map is titled 'MP90-NB:4090, Diras, Buraydah 52547 7137, Saudi Arabia'. A search bar is present with the text 'Please input name or No.' and a 'Search' button. A list of devices is shown on the left, including 'MP90-NB' (Offline 2Day), 'MT550' (Offline 5Day), and 'MT550' (Offline >60day). A popup window provides detailed information for the selected device:

- MP90-NB
- ID No.:866425030048920
- Status:Offline
- ACC status:On
- Position time:2018-04-25 15:02:38
- Stop time:3Minute
- Position Type:GPS
- Tracking Playback, Geo-fence, More

The map shows major roads like 'King Fahd Rd' and 'Western Ring Rd'. Other landmarks include 'Banquet Hall', 'Mosque', and 'Khob Al Halouah Grand Mosque'. The bottom of the interface has a 'Device Detail List' button on the left and an 'Alarm Overview' button on the right, which indicates 'Alarm sound on 9s'.



GPS Tracking - Historical trajectory

Historical trajectory:

When vehicle started moving, from server can be trace out its motion, location, speed & mileage

| No. | Position time | Lat | Lon | Speed | Direction | Address |
|-----|---------------------|----------|----------|-------|-----------|-------------------------|
| 1 | 2018-04-25 13:54:28 | 26.32163 | 43.89233 | 0.06 | North | Resolve |
| 2 | 2018-04-25 13:54:38 | 26.32163 | 43.89233 | 0.00 | North | Resolve |
| 3 | 2018-04-25 14:08:32 | 26.32171 | 43.89239 | 3.39 | North | Resolve |
| 4 | 2018-04-25 14:09:31 | 26.32171 | 43.89239 | 0.00 | North | Resolve |
| 5 | 2018-04-25 14:09:45 | 26.32168 | 43.89242 | 3.19 | North | Resolve |





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Signaling Tracing – Between Device and eNodeB

UU TRACE Procedure:

Use 'Signaling Trace' function from U2000 to monitor the communication between NB-IoT terminal and NB-IoT eNodeB. we can see the the RRC connection setup procedure and DL/UL transmission is successful.

| No. ^ | Time ^ | Standard Interface Message... ^ | Message Direction ^ | Local Cell ID ^ | CPU ID ^ | Call ID ^ |
|-------|---------------------------|---------------------------------|---------------------|-----------------|----------|-----------|
| 18 | 20/03/2018 10:39:01 (0) | RRC_CONN_REQ_NB | From UE | 50 | 1795 | 13174222 |
| 19 | 20/03/2018 10:39:01 (3) | RRC_CONN_SETUP_NB | To UE | 50 | 1795 | 13174222 |
| 20 | 20/03/2018 10:39:01 (95) | RRC_CONN_SETUP_CMP_NB | From UE | 50 | 1795 | 13174222 |
| 21 | 20/03/2018 10:39:01 (333) | RRC_DL_INFO_TRANSF_NB | To UE | 50 | 1795 | 13174222 |
| 22 | 20/03/2018 10:39:01 (663) | RRC_UL_INFO_TRANSF_NB | From UE | 50 | 1795 | 13174222 |
| 23 | 20/03/2018 10:39:01 (697) | RRC_DL_INFO_TRANSF_NB | To UE | 50 | 1795 | 13174222 |
| 24 | 20/03/2018 10:39:02 (294) | RRC_UL_INFO_TRANSF_NB | From UE | 50 | 1795 | 13174222 |
| 25 | 20/03/2018 10:39:02 (327) | RRC_DL_INFO_TRANSF_NB | To UE | 50 | 1795 | 13174222 |
| 26 | 20/03/2018 10:39:02 (405) | RRC_UL_INFO_TRANSF_NB | From UE | 50 | 1795 | 13174222 |
| 27 | 20/03/2018 10:39:02 (456) | RRC_DL_INFO_TRANSF_NB | To UE | 50 | 1795 | 13174222 |
| 28 | 20/03/2018 10:39:02 (976) | RRC_UL_INFO_TRANSF_NB | From UE | 50 | 1795 | 13174222 |
| 29 | 20/03/2018 10:39:03 (151) | RRC_DL_INFO_TRANSF_NB | To UE | 50 | 1795 | 13174222 |
| 30 | 20/03/2018 10:39:03 (295) | RRC_UL_INFO_TRANSF_NB | From UE | 50 | 1795 | 13174222 |
| 31 | 20/03/2018 10:39:13 (833) | RRC_UL_INFO_TRANSF_NB | From UE | 50 | 1795 | 13174222 |
| 32 | 20/03/2018 10:39:13 (895) | RRC_DL_INFO_TRANSF_NB | To UE | 50 | 1795 | 13174222 |
| 33 | 20/03/2018 10:39:13 (950) | RRC_UL_INFO_TRANSF_NB | From UE | 50 | 1795 | 13174222 |
| 34 | 20/03/2018 10:39:13 (984) | RRC_CONN_REL_NB | To UE | 50 | 1795 | 13174222 |
| 35 | 20/03/2018 10:39:24 (685) | RRC_CONN_REQ_NB | From UE | 50 | 1795 | 13174244 |
| 36 | 20/03/2018 10:39:24 (687) | RRC_CONN_SETUP_NB | To UE | 50 | 1795 | 13174244 |
| 37 | 20/03/2018 10:39:24 (765) | RRC_CONN_SETUP_CMP_NB | From UE | 50 | 1795 | 13174244 |
| 38 | 20/03/2018 10:39:24 (807) | RRC_DL_INFO_TRANSF_NB | To UE | 50 | 1795 | 13174244 |
| 39 | 20/03/2018 10:39:24 (860) | RRC_UL_INFO_TRANSF_NB | From UE | 50 | 1795 | 13174244 |
| 40 | 20/03/2018 10:39:24 (894) | RRC_CONN_REL_NB | To UE | 50 | 1795 | 13174244 |
| 41 | 20/03/2018 10:39:35 (549) | RRC_CONN_REQ_NB | From UE | 50 | 1795 | 13174259 |



Signaling Tracing - Between eNodeB and MME (1) Attach

MME TRACE Procedure (Attach):

From the MME trace, we can see the attach procedure and communication between UE/eNodeB/MME are successful.

| No. ^ | Mess... ^ | TimeStamp ^ | Milli... ^ | Rack/Slot... ^ | Message Direction ^ | Message... ^ | Message Type ^ | IMS/IMEI ^ | Mess... ^ | Message Content |
|-------|-----------|---------------------|------------|----------------|---------------------|--------------|------------------------------------|-----------------|-----------|--------------------------------------|
| 2494 | 17494 | 2018-03-20 10:39:01 | 183 | 0:9:SPP:4 | UE -> MME | Protocol | Attach Request | 420013302635636 | 57 | 07 41 72 0B F6 24 F0 10 80 01 10 ... |
| 2495 | 17495 | 2018-03-20 10:39:01 | 183 | 0:9:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 141 | 5A 00 00 15 04 00 00 00 5A 00 00 ... |
| 2496 | 17496 | 2018-03-20 10:39:01 | 184 | 0:9:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 77 | 5A 00 00 15 00 00 00 00 5A 00 00 ... |
| 2497 | 17497 | 2018-03-20 10:39:01 | 184 | 0:9:SPP:4 | MM -> S1AP | Internal | SPU_S1AP_RETURN_MM_CONN_INDEX | 420013302635636 | 74 | 5A 00 00 15 E4 00 00 00 5C 02 00 ... |
| 2498 | 17498 | 2018-03-20 10:39:01 | 186 | 0:9:SPP:4 | MMSDB | Internal | MM_CB | 420013302635636 | 4510 | 24 00 31 03 62 53 36 F6 68 46 52 ... |
| 2499 | 17499 | 2018-03-20 10:39:01 | 186 | 0:9:SPP:4 | MMSDB | Internal | MM_SDB_STATIC | 420013302635636 | 1064 | 01 00 FF FF 30 E4 00 00 71 10 00 ... |
| 2500 | 17500 | 2018-03-20 10:39:01 | 186 | 0:9:SPP:4 | MMSDB | Internal | MM_SDB_DYNAMIC | 420013302635636 | 1212 | 02 00 FF FF 30 E4 00 00 71 10 00 ... |
| 2501 | 17501 | 2018-03-20 10:39:01 | 186 | 0:9:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 72 | 5A 00 00 15 00 00 00 00 5A 00 00 ... |
| 2502 | 17502 | 2018-03-20 10:39:01 | 186 | 0:9:SPP:4 | MM -> UDM | Internal | MM_UDM_AUTH_INFO_REQ | 420013302635636 | 155 | 5A 00 00 15 E4 00 00 00 5A 00 00 ... |
| 2503 | 17503 | 2018-03-20 10:39:01 | 186 | 0:9:SPP:4 | MMSDB | Internal | MM_CB | 420013302635636 | 4510 | 24 00 31 03 62 53 36 F6 FF FF FF ... |
| 2504 | 17504 | 2018-03-20 10:39:01 | 186 | 0:9:SPP:4 | MMSDB | Internal | MM_SDB_STATIC | 420013302635636 | 1064 | 01 00 FF FF 30 E4 00 00 71 10 00 ... |
| 2505 | 17505 | 2018-03-20 10:39:01 | 186 | 0:9:SPP:4 | MMSDB | Internal | MM_SDB_DYNAMIC | 420013302635636 | 1212 | 02 00 FF FF 30 E4 00 00 71 10 00 ... |
| 2506 | 17506 | 2018-03-20 10:39:01 | 186 | 0:9:SPP:4 | UDM -> MM | Internal | UDM_MM_RETURN_INDEX | 420013302635636 | 65 | 5A 00 00 15 0D 01 00 00 5A 00 00 ... |
| 2507 | 17507 | 2018-03-20 10:39:01 | 186 | 0:9:SPP:4 | UDMSP->UDMCM | Internal | UDMSP_UDMCM_AUTH_INFO_REQ | 420013302635636 | 143 | 5A 00 00 15 FF 1F 00 00 5A 00 00 ... |
| 2508 | 17508 | 2018-03-20 10:39:01 | 186 | 0:9:SPP:4 | UDM->DIAM | Internal | UDM_DIAM_AUTH_INFO_REQ | 420013302635636 | 4228 | 5A 00 00 15 0D 01 00 00 5A 00 00 ... |
| 2509 | 17509 | 2018-03-20 10:39:01 | 187 | 0:9:SPP:4 | MME(SGSN) -> HSS | Protocol | Authentication Information Request | 420013302635636 | 420 | 01 00 01 A4 C0 00 01 3E 01 00 00 ... |
| 2510 | 17510 | 2018-03-20 10:39:01 | 187 | 0:9:SPP:4 | DIAM-PROC-TRC | Internal | DIAM_PROC_TRC | 420013302635636 | 170 | 02 A0 00 00 A2 00 00 00 A1 41 44 ... |
| 2511 | 17511 | 2018-03-20 10:39:01 | 386 | 0:9:SPP:4 | HSS -> MME(SGSN) | Protocol | Authentication Information Answer | 420013302635636 | 384 | 01 00 01 80 40 00 01 3E 01 00 00 ... |
| 2512 | 17512 | 2018-03-20 10:39:01 | 386 | 0:9:SPP:4 | DIAM->UDM | Internal | DIAM_UDM_AUTH_INFO_RSP | 420013302635636 | 312 | 5A 00 00 15 0E 01 00 00 5A 00 00 ... |
| 2513 | 17513 | 2018-03-20 10:39:01 | 386 | 0:9:SPP:4 | UDMCM->UDMSP | Internal | UDMCM_UDMSP_AUTH_INFO_RSP | 420013302635636 | 1312 | 5A 00 00 15 FF 2F 00 00 5A 00 00 ... |
| 2514 | 17514 | 2018-03-20 10:39:01 | 386 | 0:9:SPP:4 | UDM -> MM | Internal | UDM_MM_AUTH_INFO_RSP | 420013302635636 | 80 | 5A 00 00 15 0D 01 00 00 5A 00 00 ... |
| 2515 | 17515 | 2018-03-20 10:39:01 | 387 | 0:9:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 84 | 5A 00 00 15 06 00 00 00 5A 00 00 ... |
| 2516 | 17516 | 2018-03-20 10:39:01 | 387 | 0:9:SPP:4 | MME -> UE | Protocol | Authentication Request | 420013302635636 | 36 | 07 52 05 04 FC 6F 22 8B 57 1B C... |
| 2517 | 17517 | 2018-03-20 10:39:01 | 387 | 0:9:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 120 | 5A 00 00 15 00 00 00 00 5A 00 00 ... |
| 2518 | 17518 | 2018-03-20 10:39:01 | 387 | 0:9:SPP:4 | MM -> S1AP | Internal | SPU_S1AP_DOWNLINK_NAS_TRANSPORT | 420013302635636 | 123 | 5A 00 00 15 E4 00 00 00 5C 02 00 ... |
| 2519 | 17519 | 2018-03-20 10:39:01 | 387 | 0:9:SPP:4 | MMSDB | Internal | MM_CB | 420013302635636 | 4510 | 24 00 31 03 62 53 36 F6 FF FF FF ... |
| 2520 | 17520 | 2018-03-20 10:39:01 | 387 | 0:9:SPP:4 | MMSDB | Internal | MM_SDB_STATIC | 420013302635636 | 1064 | 01 00 FF FF 30 E4 00 00 71 10 00 ... |
| 2521 | 17521 | 2018-03-20 10:39:01 | 387 | 0:9:SPP:4 | MMSDB | Internal | MM_SDB_DYNAMIC | 420013302635636 | 1212 | 02 00 FF FF 30 E4 00 00 71 10 00 ... |
| 2522 | 17522 | 2018-03-20 10:39:01 | 393 | 3:1:SGP:6 | MME -> eNodeB | Protocol | DOWNLINK NAS TRANSPORT | 420013302635636 | 161 | 5C 02 00 16 0C 01 00 00 5C 02 0... |
| 2523 | 17523 | 2018-03-20 10:39:01 | 393 | 3:1:SGP:6 | S1APADP -> SCTP | Internal | DOWNLINK_NAS_TRANSPORT | 420013302635636 | 161 | 5C 02 00 16 0C 01 00 00 5C 02 0... |
| 2524 | 17524 | 2018-03-20 10:39:01 | 754 | 3:1:SGP:6 | SCTP -> S1APADP | Internal | UPLINK NAS TRANSPORT | 420013302635636 | 158 | 5C 02 00 16 F5 00 00 00 5C 02 00... |
| 2525 | 17525 | 2018-03-20 10:39:01 | 754 | 3:1:SGP:6 | S1APADP -> S1AP | Internal | UPLINK_NAS_TRANSPORT | 420013302635636 | 158 | 5C 02 00 16 0B 01 00 00 5C 02 0... |
| 2526 | 17526 | 2018-03-20 10:39:01 | 754 | 3:1:SGP:6 | eNodeB -> MME | Protocol | UPLINK NAS TRANSPORT | 420013302635636 | 158 | 5C 02 00 16 0B 01 00 00 5C 02 0... |
| 2527 | 17527 | 2018-03-20 10:39:01 | 754 | 3:1:SGP:6 | S1AP -> MM | Internal | UPLINK NAS TRANSPORT | 420013302635636 | 92 | 5C 02 00 16 0C 01 00 00 5A 00 00... |
| 2528 | 17528 | 2018-03-20 10:39:01 | 750 | 0:9:SPP:4 | S1AP -> MM | Internal | S1AP_SPU_UPLINK_NAS_TRANSPORT | 420013302635636 | 92 | 5C 02 00 16 0C 01 00 00 5A 00 00... |
| 2529 | 17529 | 2018-03-20 10:39:01 | 750 | 0:9:SPP:4 | UE -> MME | Protocol | Authentication Response | 420013302635636 | 11 | 07 53 08 81 FD EF 39 6D ED 2E B3 |
| 2665 | 17665 | 2018-03-20 10:39:03 | 193 | 0:9:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 68 | 5A 00 00 15 08 00 00 00 5A 00 00 ... |
| 2666 | 17666 | 2018-03-20 10:39:03 | 194 | 0:9:SPP:4 | MME -> UE | Protocol | Attach Accept | 420013302635636 | 135 | 07 42 01 49 06 40 24 F0 10 36 AF... |
| 2667 | 17667 | 2018-03-20 10:39:03 | 194 | 0:9:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 225 | 5A 00 00 15 00 00 00 00 5A 00 00 ... |
| 2668 | 17668 | 2018-03-20 10:39:03 | 194 | 0:9:SPP:4 | MM -> S1AP | Internal | SPU_S1AP_DOWNLINK_NAS_TRANSPORT | 420013302635636 | 228 | 5A 00 00 15 E4 00 00 00 5C 02 00 ... |
| 2669 | 17669 | 2018-03-20 10:39:03 | 194 | 0:9:SPP:4 | MMSDB | Internal | MM_CB | 420013302635636 | 4510 | 24 00 31 03 62 53 36 F6 68 46 52 ... |
| 2670 | 17670 | 2018-03-20 10:39:03 | 194 | 0:9:SPP:4 | MMSDB | Internal | MM_SDB_STATIC | 420013302635636 | 1064 | 01 00 FF FF 30 E4 00 00 71 10 00 ... |
| 2671 | 17671 | 2018-03-20 10:39:03 | 194 | 0:9:SPP:4 | MMSDB | Internal | MM_SDB_DYNAMIC | 420013302635636 | 1212 | 02 00 FF FF 30 E4 00 00 71 10 00 ... |
| 2672 | 17672 | 2018-03-20 10:39:03 | 200 | 3:1:SGP:6 | MME -> eNodeB | Protocol | DOWNLINK NAS TRANSPORT | 420013302635636 | 269 | 5C 02 00 16 0C 01 00 00 5C 02 0... |
| 2673 | 17673 | 2018-03-20 10:39:03 | 200 | 3:1:SGP:6 | S1APADP -> SCTP | Internal | DOWNLINK_NAS_TRANSPORT | 420013302635636 | 269 | 5C 02 00 16 0C 01 00 00 5C 02 0... |
| 2674 | 17674 | 2018-03-20 10:39:03 | 374 | 3:1:SGP:6 | SCTP -> S1APADP | Internal | UPLINK NAS TRANSPORT | 420013302635636 | 160 | 5C 02 00 16 F5 00 00 00 5C 02 00... |
| 2675 | 17675 | 2018-03-20 10:39:03 | 374 | 3:1:SGP:6 | S1APADP -> S1AP | Internal | UPLINK_NAS_TRANSPORT | 420013302635636 | 160 | 5C 02 00 16 0B 01 00 00 5C 02 0... |
| 2676 | 17676 | 2018-03-20 10:39:03 | 374 | 3:1:SGP:6 | eNodeB -> MME | Protocol | UPLINK NAS TRANSPORT | 420013302635636 | 160 | 5C 02 00 16 0B 01 00 00 5C 02 0... |
| 2677 | 17677 | 2018-03-20 10:39:03 | 375 | 3:1:SGP:6 | S1AP -> MM | Internal | UPLINK NAS TRANSPORT | 420013302635636 | 94 | 5C 02 00 16 0C 01 00 00 5A 00 00... |
| 2678 | 17678 | 2018-03-20 10:39:03 | 370 | 0:9:SPP:4 | S1AP -> MM | Internal | S1AP_SPU_UPLINK_NAS_TRANSPORT | 420013302635636 | 94 | 5C 02 00 16 0C 01 00 00 5A 00 00... |
| 2679 | 17679 | 2018-03-20 10:39:03 | 370 | 0:9:SPP:4 | UE -> MME | Protocol | Attach Complete | 420013302635636 | 13 | 27 D5 30 59 EF 03 07 43 00 03 52... |
| 2680 | 17680 | 2018-03-20 10:39:03 | 370 | 0:9:SPP:4 | MM -> MM | Internal | MM_MM_INTERNAL | 420013302635636 | 97 | 5A 00 00 15 04 00 00 00 5A 00 00 ... |
| 2681 | 17681 | 2018-03-20 10:39:03 | 370 | 0:9:SPP:4 | MM -> SM | Internal | MM_SM_FWD_L3_MSG | 420013302635636 | 145 | 5A 00 00 15 E4 00 00 00 5A 00 00 ... |
| 2682 | 17682 | 2018-03-20 10:39:03 | 370 | 0:9:SPP:4 | MMSDB | Internal | MM_CB | 420013302635636 | 4510 | 24 00 31 03 62 53 36 F6 68 46 52 ... |



Signaling Tracing - Between eNodeB and MME (2) Attach Parameter Checking

NB-IoT Parameter Checking:

From the MME trace, we can see the MME will send attach accept message to UE, message include the TAC(13999),QCI(9),APN(jawalnet.com.sa),PLMN(42001),

The screenshot displays a signaling trace with two main components: a table of RRC messages and a detailed view of an eSM-message-container.

| No. | Time | Standard Interface Message | Message Direction | Local Cell |
|-----|---------------------------|----------------------------|-------------------|------------|
| 18 | 20/03/2018 10:39:01 (0) | RRC_CONN_REQ_NB | From UE | 50 |
| 19 | 20/03/2018 10:39:01 (3) | RRC_CONN_SETUP_NB | To UE | 50 |
| 20 | 20/03/2018 10:39:01 (95) | RRC_CONN_SETUP_CMP_NB | From UE | 50 |
| 21 | 20/03/2018 10:39:01 (333) | RRC_DL_INFO_TRANSF_NB | To UE | 50 |
| 22 | 20/03/2018 10:39:01 (663) | RRC_UL_INFO_TRANSF_NB | From UE | 50 |
| 23 | 20/03/2018 10:39:01 (697) | RRC_DL_INFO_TRANSF_NB | To UE | 50 |
| 24 | 20/03/2018 10:39:02 (294) | RRC_UL_INFO_TRANSF_NB | From UE | 50 |
| 25 | 20/03/2018 10:39:02 (327) | RRC_DL_INFO_TRANSF_NB | To UE | 50 |
| 26 | 20/03/2018 10:39:02 (405) | RRC_UL_INFO_TRANSF_NB | From UE | 50 |
| 27 | 20/03/2018 10:39:02 (456) | RRC_DL_INFO_TRANSF_NB | To UE | 50 |
| 28 | 20/03/2018 10:39:02 (976) | RRC_UL_INFO_TRANSF_NB | From UE | 50 |
| 29 | 20/03/2018 10:39:03 (151) | RRC_DL_INFO_TRANSF_NB | To UE | 50 |
| 30 | 20/03/2018 10:39:03 (295) | RRC_UL_INFO_TRANSF_NB | From UE | 50 |
| 31 | 20/03/2018 10:39:13 (833) | RRC_UL_INFO_TRANSF_NB | From UE | 50 |
| 32 | 20/03/2018 10:39:13 (895) | RRC_DL_INFO_TRANSF_NB | To UE | 50 |
| 33 | 20/03/2018 10:39:13 (950) | RRC_UL_INFO_TRANSF_NB | From UE | 50 |
| 34 | 20/03/2018 10:39:13 (984) | RRC_CONN_REL_NB | To UE | 50 |
| 35 | 20/03/2018 10:39:24 (685) | RRC_CONN_REQ_NB | From UE | 50 |
| 36 | 20/03/2018 10:39:24 (687) | RRC_CONN_SETUP_NB | To UE | 50 |
| 37 | 20/03/2018 10:39:24 (765) | RRC_CONN_SETUP_CMP_NB | From UE | 50 |
| 38 | 20/03/2018 10:39:24 (807) | RRC_DL_INFO_TRANSF_NB | To UE | 50 |
| 39 | 20/03/2018 10:39:24 (860) | RRC_UL_INFO_TRANSF_NB | From UE | 50 |
| 40 | 20/03/2018 10:39:24 (894) | RRC_CONN_REL_NB | To UE | 50 |
| 41 | 20/03/2018 10:39:35 (549) | RRC_CONN_REQ_NB | From UE | 50 |

The eSM-message-container details are as follows:

- partial-tracking-area-identity-list
 - tac-and-mcc-mnc
 - mcc-mnc:24 F0 10
 - tac:0x36af (13999) — TAC
 - other-TAC-and-mcc-mnc
- eSM-message-container
 - no-security-protection-SM-message
 - ePS-bearer-identity:0x5 (5)
 - procedure-transaction-identity:0x1 (1)
 - msg-body
 - activateDefaultEPSBearerContextRequest
 - ePS-QoS
 - qci:0x9 (9) — NB-IoT QCI
 - access-point-name
 - CHARACTER-STRING:jawalnet — APN
 - CHARACTER-STRING:com
 - CHARACTER-STRING:sa — PLMN
 - CHARACTER-STRING:MNC001
 - CHARACTER-STRING:MCC420
 - CHARACTER-STRING:GPRS
 - pDN-address
 - spare:0x0 (0)
 - pDN-type-value:IPv4 (1)
 - ipv4-address
 - uladdr1:0x64 (100)



Signaling Tracing - Between eNodeB and MME (3) Detach

MME TRACE Procedure (Detach):

From the MME trace, we can see the detach successful.

| No. ^ | Mess... ^ | TimeStamp ^ | Milli... ^ | Rack/Slot... ^ | Message Direction ^ | Messag... ^ | Message Type ^ | IMSI/IMEI ^ | Mess... ^ | Message Content |
|-------|-----------|---------------------|------------|----------------|---------------------|-------------|---------------------------------|-----------------|-----------|--------------------------------------|
| 2790 | 17790 | 2018-03-20 10:39:14 | 519 | 0:9:SPP:4 | MME(SGSN) -> SGW | Protocol | Release Access Bearers Request | 420013302635636 | 193 | 5A 00 00 15 E5 00 00 00 5A 00 00 ... |
| 2791 | 17791 | 2018-03-20 10:39:14 | 519 | 0:9:SPP:4 | SM-USER-CB-SDB | Internal | SM_USER_CB_SDB | 420013302635636 | 3360 | 01 0D 03 00 01 01 01 FF 00 00 00 ... |
| 2792 | 17792 | 2018-03-20 10:39:14 | 519 | 0:9:SPP:4 | SM-MPDP-CB-SDB | Internal | SM_MPDP_CB_SDB | 420013302635636 | 7847 | 02 0D 03 00 01 01 01 FF 00 00 00 ... |
| 2793 | 17793 | 2018-03-20 10:39:14 | 519 | 0:9:SPP:4 | SM-PDP-CB-SDB | Internal | SM_PDP_CB_SDB | 420013302635636 | 2350 | 03 0D 03 00 01 01 01 FF 00 00 00 ... |
| 2794 | 17794 | 2018-03-20 10:39:14 | 523 | 3:1:SGP:6 | SCTP -> S1APADP | Internal | UE CONTEXT RELEASE COMPLETE | 420013302635636 | 165 | 5C 02 00 16 F5 00 00 00 5C 02 00 ... |
| 2795 | 17795 | 2018-03-20 10:39:14 | 530 | 0:9:SPP:4 | SGW -> MME(SGSN) | Protocol | Release Access Bearers Response | 420013302635636 | 204 | 5A 00 00 15 D1 00 00 00 5A 00 00 ... |
| 2796 | 17796 | 2018-03-20 10:39:14 | 530 | 0:9:SPP:4 | SM-USER-CB-SDB | Internal | SM_USER_CB_SDB | 420013302635636 | 3360 | 01 0D 03 00 01 0F 22 FF 00 00 30 ... |
| 2797 | 17797 | 2018-03-20 10:39:14 | 530 | 0:9:SPP:4 | SM-MPDP-CB-SDB | Internal | SM_MPDP_CB_SDB | 420013302635636 | 7847 | 02 0D 03 00 01 01 01 FF 00 00 00 ... |
| 2798 | 17798 | 2018-03-20 10:39:14 | 530 | 0:9:SPP:4 | SM-PDP-CB-SDB | Internal | SM_PDP_CB_SDB | 420013302635636 | 2350 | 03 0D 03 00 01 01 01 FF 00 00 00 ... |
| 2799 | 17799 | 2018-03-20 10:39:14 | 531 | 0:9:SPP:4 | SM -> GTPC | Internal | SPU_GTPC_RECOVERY_NOTIFY_REQ | 420013302635636 | 197 | 5A 00 00 15 E5 00 00 00 5A 00 00 ... |
| 2800 | 17800 | 2018-03-20 10:39:14 | 531 | 0:9:SPP:4 | SM-USER-CB-SDB | Internal | SM_USER_CB_SDB | 420013302635636 | 3360 | 01 0D 03 00 01 0F 22 FF 00 00 00 ... |
| 2801 | 17801 | 2018-03-20 10:39:14 | 532 | 0:9:SPP:4 | SM-MPDP-CB-SDB | Internal | SM_MPDP_CB_SDB | 420013302635636 | 7847 | 02 0D 03 00 01 01 01 FF 00 00 00 ... |
| 2802 | 17802 | 2018-03-20 10:39:14 | 532 | 0:9:SPP:4 | SM-PDP-CB-SDB | Internal | SM_PDP_CB_SDB | 420013302635636 | 2350 | 03 0D 03 00 01 01 01 FF 00 00 00 ... |
| 2803 | 17803 | 2018-03-20 10:39:14 | 532 | 0:9:SPP:4 | SM -> MM | Internal | SM_MM_CTRL_REL_CONN_CNF | 420013302635636 | 80 | 5A 00 00 15 E5 00 00 00 5A 00 00 ... |
| 2804 | 17804 | 2018-03-20 10:39:14 | 532 | 0:9:SPP:4 | SM-USER-CB-SDB | Internal | SM_USER_CB_SDB | 420013302635636 | 3360 | 01 0D 03 00 01 0F 22 FF 00 00 00 ... |
| 2805 | 17805 | 2018-03-20 10:39:14 | 532 | 0:9:SPP:4 | SM-MPDP-CB-SDB | Internal | SM_MPDP_CB_SDB | 420013302635636 | 7847 | 02 0D 03 00 01 01 01 FF 00 00 00 ... |
| 2806 | 17806 | 2018-03-20 10:39:14 | 532 | 0:9:SPP:4 | SM-PDP-CB-SDB | Internal | SM_PDP_CB_SDB | 420013302635636 | 2350 | 03 0D 03 00 01 01 01 FF 00 00 00 ... |
| 2807 | 17807 | 2018-03-20 10:39:14 | 532 | 0:9:SPP:4 | SM-PROC-TRC | Internal | SM_PROC_TRC | 420013302635636 | 412 | 10 0D 00 00 94 01 00 00 30 53 6D ... |
| 2808 | 17808 | 2018-03-20 10:39:14 | 532 | 0:9:SPP:4 | SM-PROC-TRC | Internal | SM_PROC_TRC | 420013302635636 | 201 | 10 0D 00 00 C1 00 00 00 30 53 6 ... |
| 2809 | 17809 | 2018-03-20 10:39:14 | 532 | 0:9:SPP:4 | SM-PROC-TRC | Internal | SM_PROC_TRC | 420013302635636 | 171 | 10 0D 00 00 A3 00 00 00 2B 53 6 ... |
| 2810 | 17810 | 2018-03-20 10:39:14 | 523 | 3:1:SGP:6 | S1APADP -> S1AP | Internal | UE_CONTEXT_REL_COMPLETE | 420013302635636 | 165 | 5C 02 00 16 0B 01 00 00 5C 02 0 ... |
| 2811 | 17811 | 2018-03-20 10:39:14 | 523 | 3:1:SGP:6 | eNodeB -> MME | Protocol | UE CONTEXT RELEASE COMPLETE | 420013302635636 | 165 | 5C 02 00 16 0B 01 00 00 5C 02 0 ... |
| 2812 | 17812 | 2018-03-20 10:39:14 | 523 | 3:1:SGP:6 | S1AP -> MM | Internal | UE CONTEXT RELEASE CMP | 420013302635636 | 374 | 5C 02 00 16 0C 01 00 00 5A 00 00 ... |
| 2813 | 17813 | 2018-03-20 10:39:24 | 841 | 0:9:SPP:4 | S1AP -> MM | Internal | S1AP_SPU_INIT_UE_MSG | 420013302635636 | 177 | 5C 02 00 16 0C 01 00 00 5A 00 00 ... |

GPS Tracking - Real Time Tracking

Real Time Tracking:

When GPS Tracking device is debugged setup on Band3 and switch ON, it will connect to the network and from the tracing server car location and position can be identified.

The screenshot displays a web-based GPS tracking interface. The browser address bar shows the URL: www.trackits.com/Monitor.aspx?id=100470&n=Huawei&t=1&p=HM96QU3002a98705. The page header includes the "GPS" logo, the user name "Huawei", and navigation icons for "Monitor", "Statistics", "Device", and "Recharge". A user greeting "Hello! Huawei" and links for "[Change Password My Service] Exit" are also present.

The main content area features a map of Fahad Bin Sultan University. A popup window displays the following details for device MT550:

- MT550
- ID No.: 880425030088134
- Status: Stop
- ACC status: On
- Position time: 2018-03-12 11:56:43
- Stop time: 55 Minute
- Position Type: GPS
- Tracking Playback, Geo-fence, More

On the left side, there is a "Device Detail List" table with the following entries:

| Device ID | Status |
|-----------|---------------|
| MT550 | Offline 25Day |
| MT550 | Offline 37Day |
| MT550 | Offline 55Day |
| MT550 | Stop |

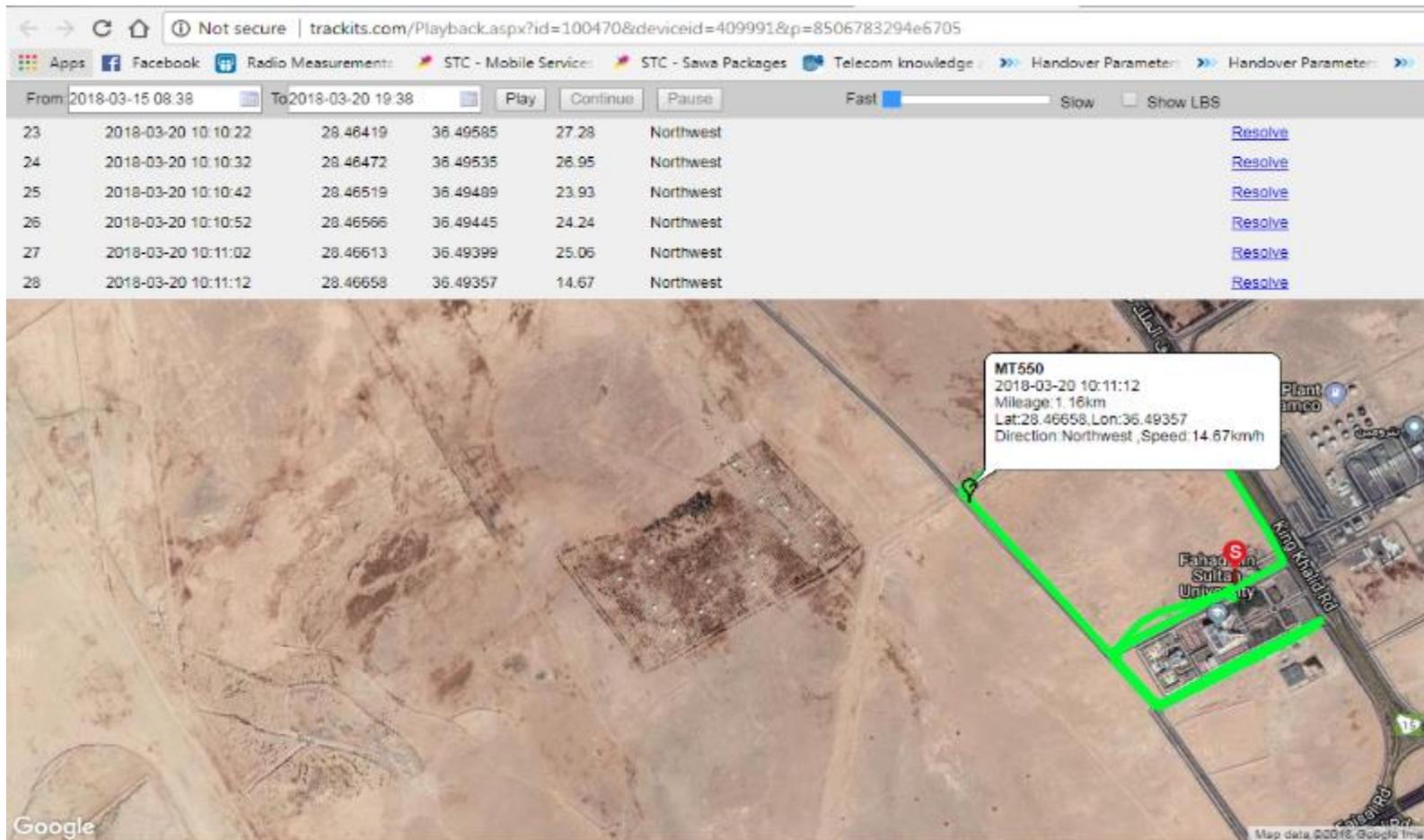
The interface also includes a search bar, a "Refresh after seconds!" indicator, and a "Target name" field. The bottom of the page shows a "Device Detail List" tab, a "Google" logo, and an "Alarm Overview" section with the text "Alarm sound on 21s".



GPS Tracking - Historical trajectory

Historical trajectory:

When vehicle started moving, from server can be trace out its motion, location, speed & mileage



Appendix





NB-IoT GPS Tracking Device Setup

ATK XCOM V2.0

```

ID: 866425030049920
TIME_ZONE: 0
SIMS: OFF
CALL: ON
INCOMING: ON
MONITOR: OFF
APGS: OFF
LASTGPS: OFF

<Trace>: U1:
U2:
U3:
UP: 0000
GSENSOR: OFF, 70, 70, 2, 187

<Trace>: GPRS: ON, ON
GU: MT620, 0000
SRV: IP: 112.95.164.248, 7700
APN: jawalnet.com.sa..

<Trace>: LIMIT_SPEED: 0
MST_MODE: OFF, 0
G=NO, 00000E0, 00000, NO, 00000E0, 00000, OFF
R=0, 1, OFF
AUTO_SAMP: 10s, 1
TOWED_SAMP: 30s, 1
SAVE_SAMP: 5m

<Trace>: >>> OPERATOR: [STC STC]
<Trace>: #### ACT: [CAT-NB1] OPER: [42001] BAND: [CDMA BC0] CHAN: [9405]
<Trace>: Get Bk_Data Null.

<Trace>: ABLE: 805.
<Trace>: ABLE: WDG.
<Trace>: start gps.
  
```

串口选择: COM28:Prolific USB-to-Serial

波特率: 921600

停止位: 1

数据位: 8

奇偶校验: 无

串口操作: 关闭串口

保存窗口 清除接收

16进制显示 白底黑字

RTS DTR

时间戳(以换行回车断帧)

单条发送 多条发送 协议传输 帮助

| | | | | |
|--|---|------------------------------------|---|---------------------------------|
| <input type="checkbox"/> ETS | 0 | <input type="checkbox"/> NWM,3,1,3 | 5 | <input type="checkbox"/> 发送新行 |
| <input type="checkbox"/> NUN,13424392330,1 | 1 | <input type="checkbox"/> BAND,0,28 | 6 | <input type="checkbox"/> 16进制发送 |
| <input type="checkbox"/> 803.jawalnet.com.sa.. | 2 | <input type="checkbox"/> RCONF | 7 | <input type="checkbox"/> 关联数字键盘 |
| <input type="checkbox"/> 804.112.95.164.248.7700 | 3 | <input type="checkbox"/> | 8 | <input type="checkbox"/> 自动循环发送 |
| <input type="checkbox"/> 805.10,1 | 4 | <input type="checkbox"/> QTS | 9 | 周期: 1000 ms |

首页 上一页 下一页 尾页 导入导出条目

www.openedv.com S:0 R:1008 CTS=1 DSR=1 DCD=1 当前时间 14:42:10

Windows taskbar: 2:42 PM 4/25/2018

*Configure frequency band as B28 in device

GPS tracking device configuration software, setting the NB-IoT network frequency band, APN, PLMN etc.

Thank You

