BMW LAB OAI Project Team

NB-IoT Commercial UE Testing

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Outline

- NB-IoT UE & UELogviewer
- System Architecture
- MSC for AT-Commands
- Testing Result

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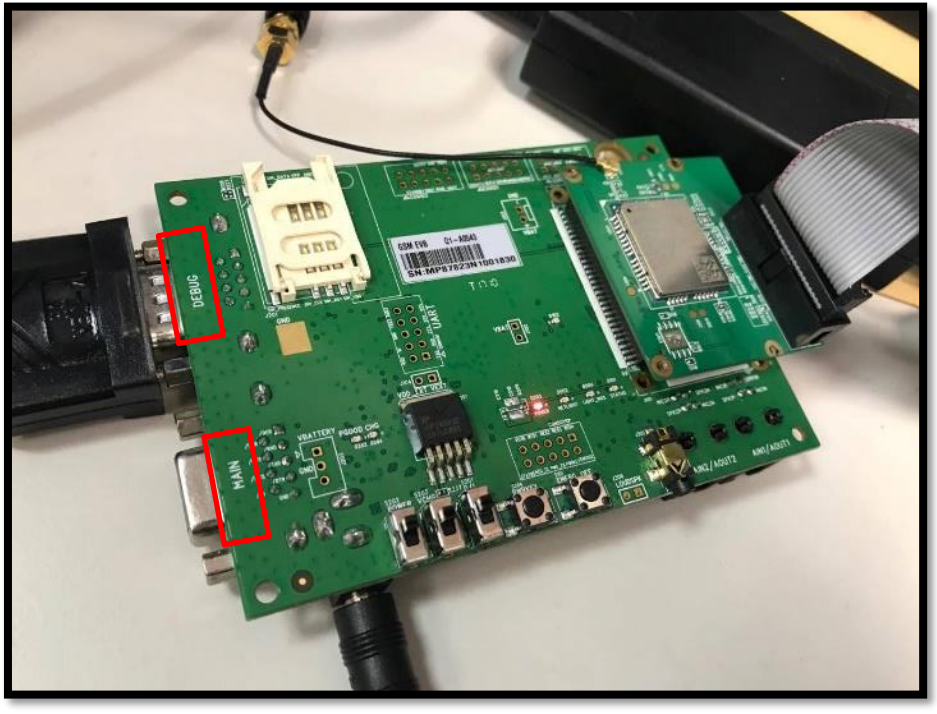
NB-IoT UE

- NB-IoT UE module is using quectel band28 chip.
- Debug port in this module is for reading log.
- Main port in this module is for sending AT-Command.



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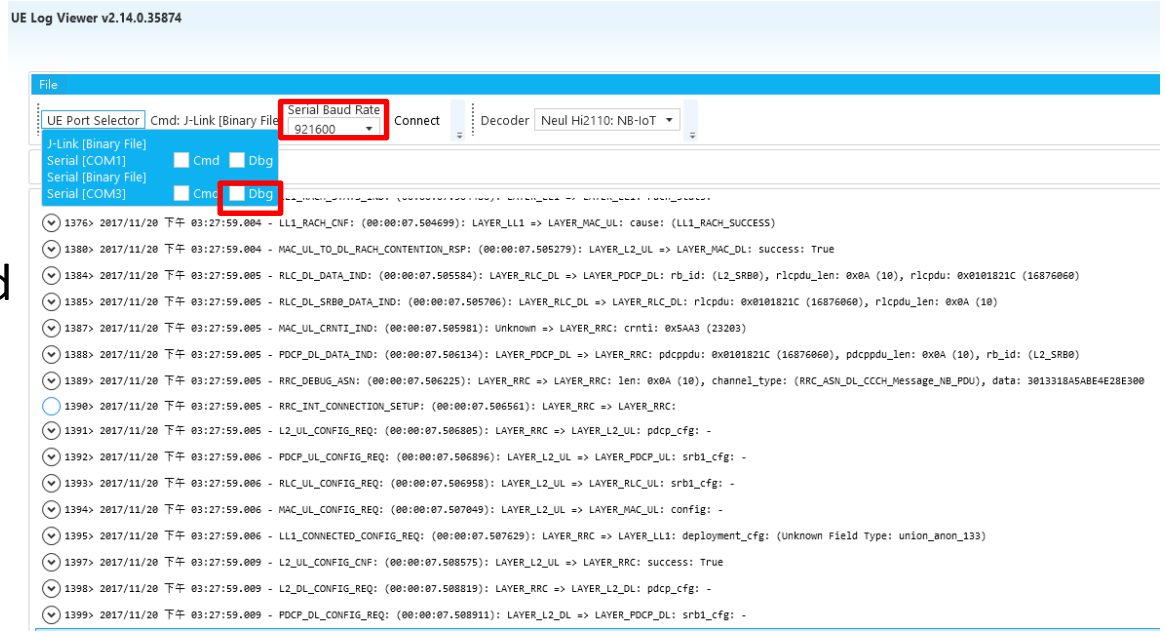
UELogviewer

- Quectel company provides the UELogViewer tool to debug.
- Select debug port and use default baud rate (921600) to read the log.



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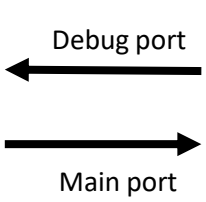
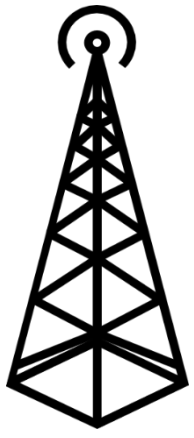
System Architecture

PC/Laptop

NB-IoT UE Module

NB-IoT Base Station & Core Network





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- **MSC for AT-Commands**
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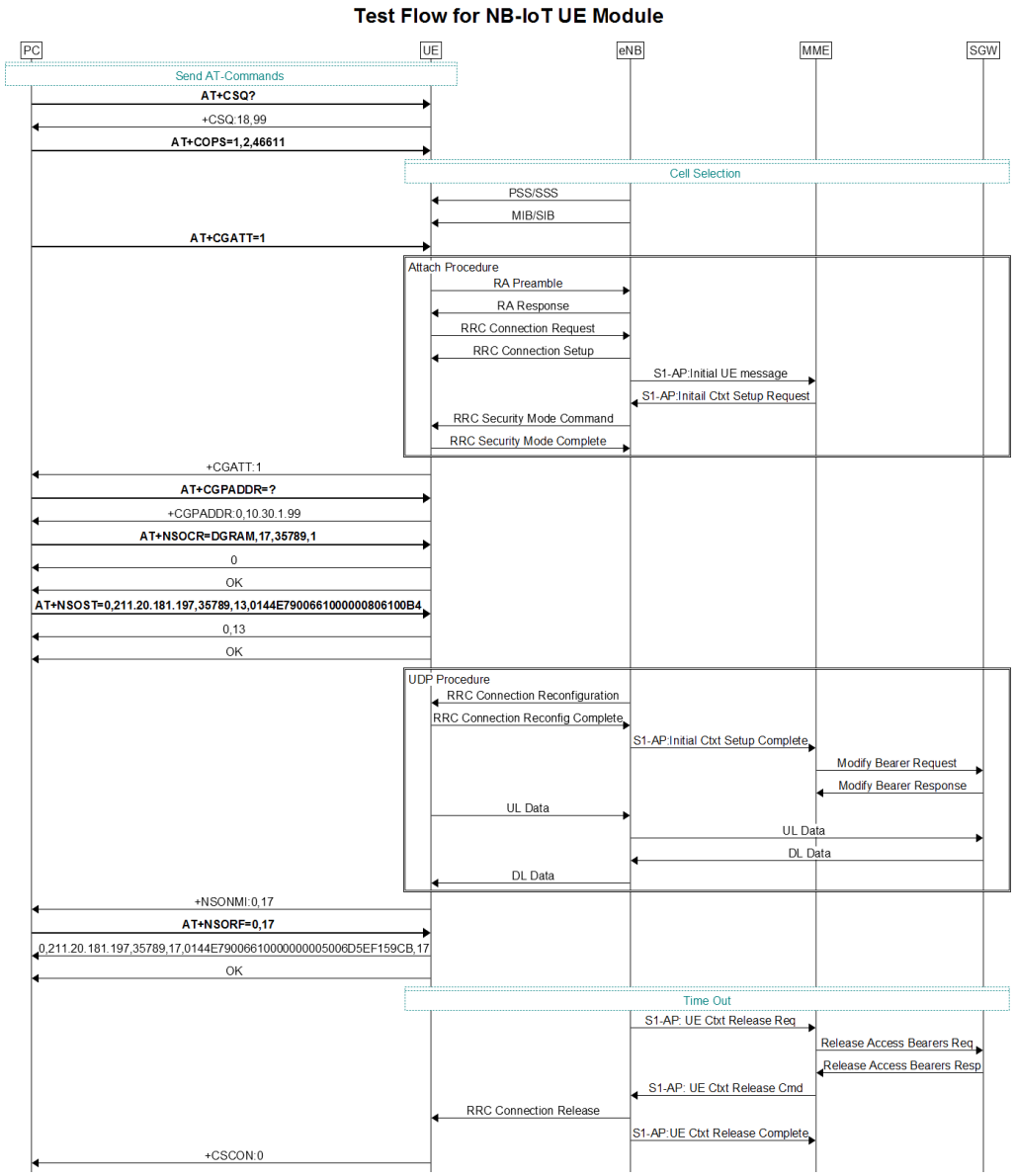
MSC

- Use AT-Commands to complete attach procedure and UDP procedure.



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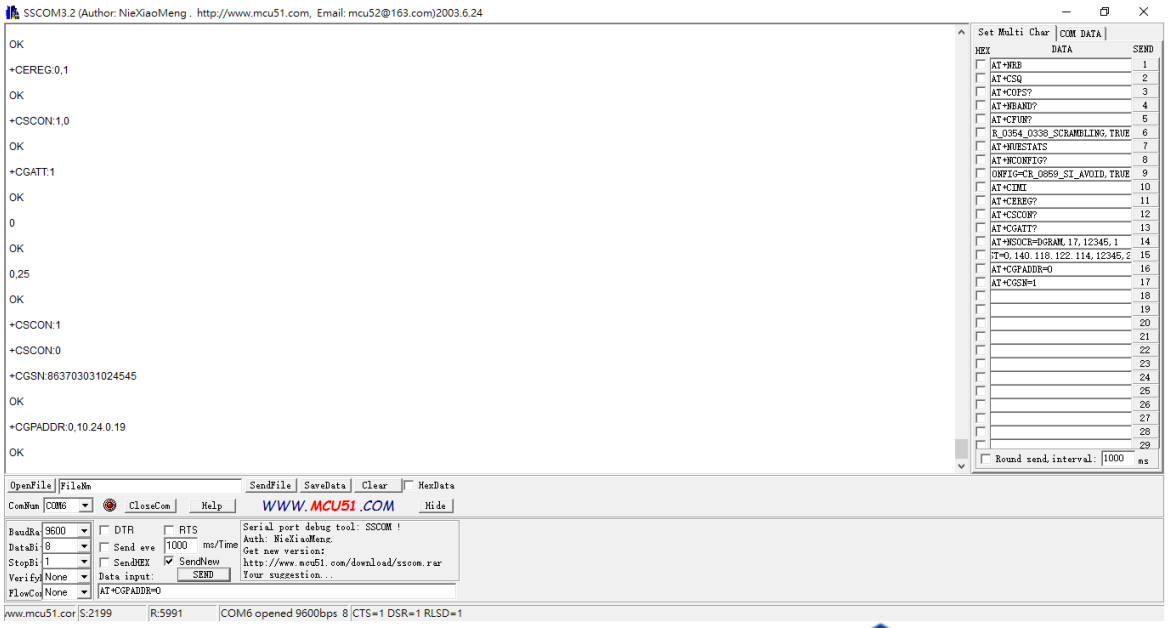
- **Testing Result**

Testing Result for attach procedure

- Use FarEasTone SIM card
- CGATT: 1
  - Mean that network actives
- CSCON: 1
  - Mean that RRC connected
- CREG: 1
  - Mean that register home network successfully



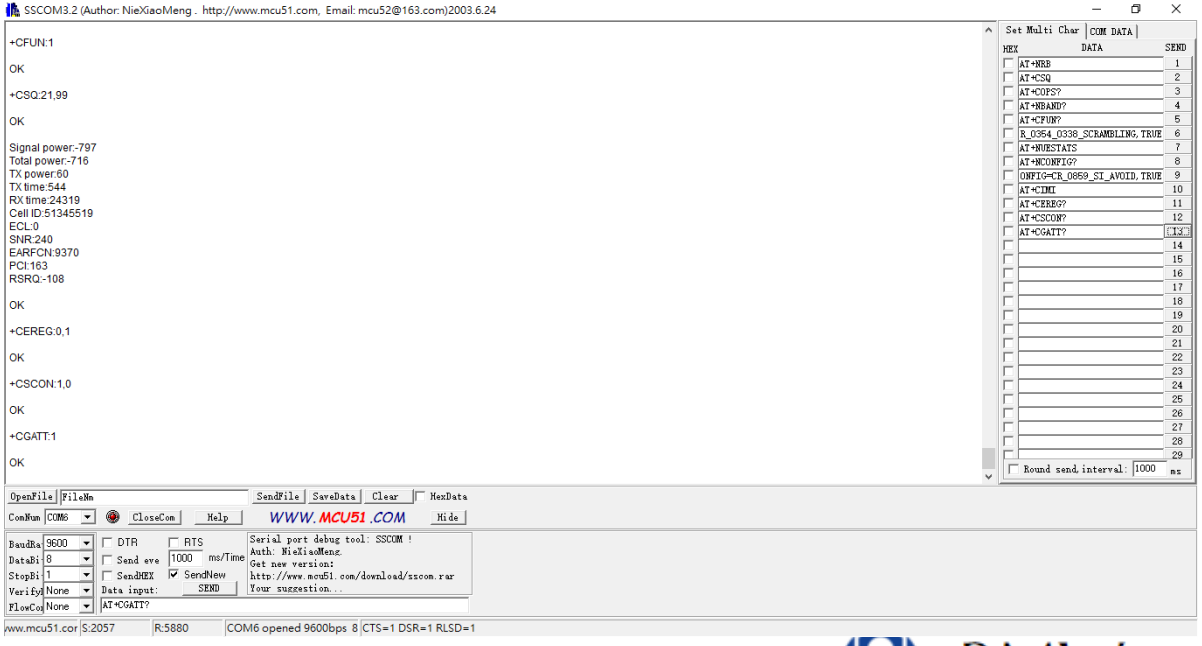
Testing Result for UDP procedure

- AT+NSOST=0,140.118.122.114,12345,25,400241C7B17401724D0265703D3230313630383
23331363438

IP for UDP server.

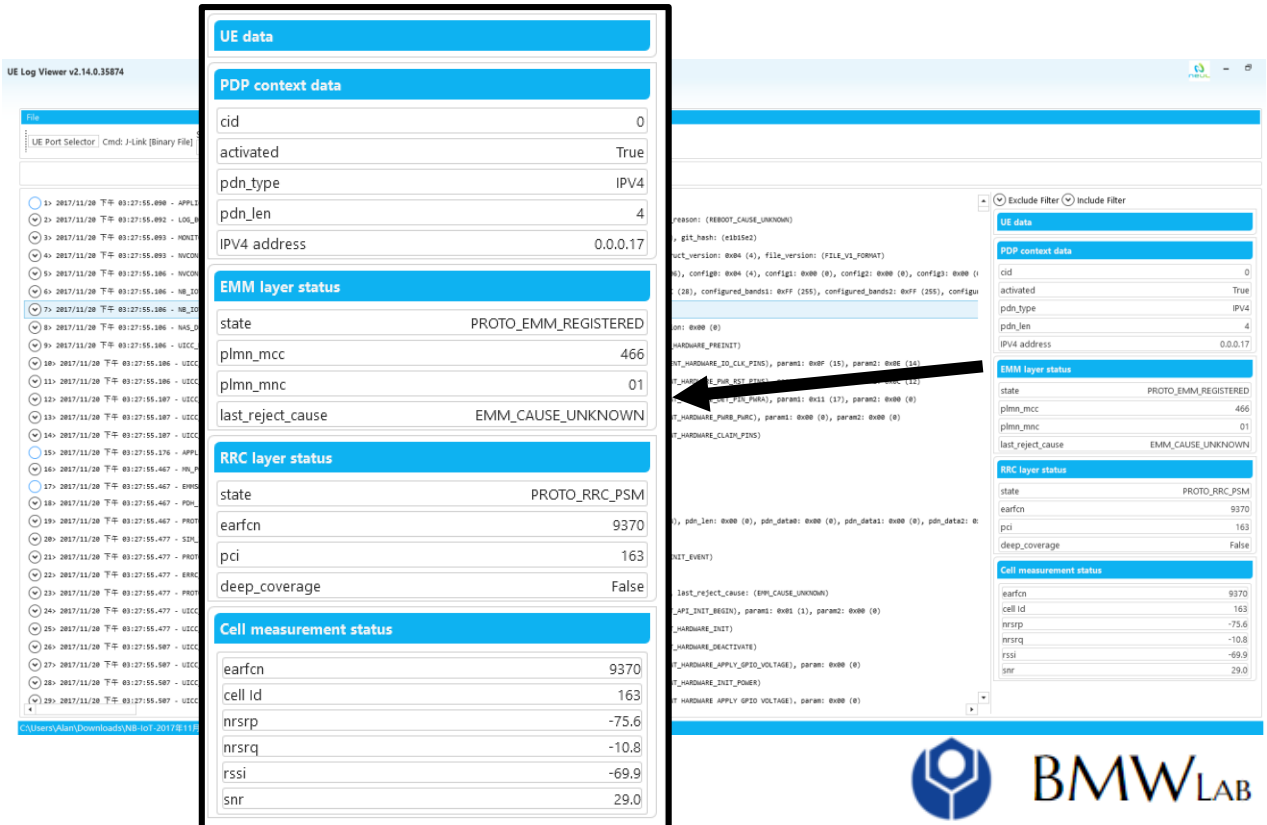
Received HEX Data Log

{211.77.241.100} 40 02 41 C7 B1 74 01 72 4D 02 65 70 3D



Log Information

- EMM Layer Status
- RRC Layer Status
- Cell Measurement Status



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Log Information (1)Power on

- **Check the UE log in the following figure**
- **Filter condition :** ERRC_INIT、usim_read

```
22> 2017/11/20 下午 03:27:55.477 - ERRC_INIT_REQ: (00:00:04.016815): LAYER_EMMSM => LAYER_RRC: dummy: 0x00 (0)
123> 2017/11/20 下午 03:27:56.255 - ERRC_INIT_CNF: (00:00:04.748504): LAYER_RRC => LAYER_EMMSM: status: (ACT_STATUS_OK)
status: (ACT_STATUS_OK)
252> 2017/11/20 下午 03:27:56.345 - USIM_READ_PART_1_DATA_REQ: (00:00:04.851654): LAYER_EMMSM => LAYER_SIM: dummy: 0x00 (0)
860> 2017/11/20 下午 03:27:56.776 - USIM_READ_PART_1_DATA_CNF: (00:00:05.286285): LAYER_SIM => LAYER_EMMSM: card_present: True
card_present: True, admin_data0: 0x00 (0), admin_data1: 0x00 (0), admin_data2: 0x01 (1), admin_data3: 0x02 (2)
imsi: -
  len: 0x08 (8) imsi: 0x010182BC (16876220)
```

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Log Information (2)Search network

- **Check the UE log in the following figure**
- **Filter condition :** ERRC_CELL_SELECT、LL1_FREQ_SEARCH、cell_suit、asn

871> 2017/11/20 下午 03:27:56.777 - ERRC_CELL_SELECT_REQ: (00:00:05.292755): LAYER_EMMSM => LAYER_RRC: search_type: (SCS_SEARCH_TYPE), deep_coverage: True

873> 2017/11/20 下午 03:27:56.778 - LL1_FREQ_SEARCH_REQ: (00:00:05.294433): LAYER_RRC => LAYER_LL1: earfcn: 0x249A (9370), slow_search: False, freq_offset_p

1106> 2017/11/20 下午 03:27:57.308 - LL1_FREQ_SEARCH_CNF: (00:00:05.832214): LAYER_LL1 => LAYER_RRC: earfcn: 0x249A (9370)

1157> 2017/11/20 下午 03:27:57.659 - RRC_DBG_CELL_SUITABILITY: (00:00:06.196502): LAYER_RRC => LAYER_RRC: earfcn: 0x249A (9370), pcid: 0xA3 (163), rrc_state

earfcn: 0x249A (9370), pcid: 0xA3 (163), rrc_state: 0x00 (0), suitable: True, s_failed: False, forbidden: False, reserved: False, barred: False, barred_timer_running: False,

1237> 2017/11/20 下午 03:27:58.660 - ERRC_CELL_SELECT_CNF: (00:00:07.182342): LAYER_RRC => LAYER_EMMSM: shared_nw_plmn_list: -

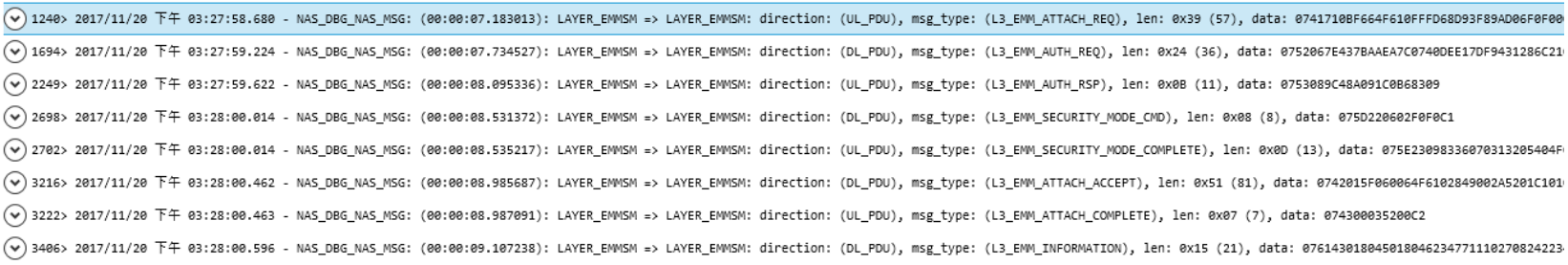
13835> 2017/11/20 下午 03:28:10.822 - RRC_DBG_CELL_SUITABILITY: (00:00:19.351715): LAYER_RRC => LAYER_RRC: earfcn: 0x249A (9370), pcid: 0xA3 (163), rrc_stat

13859> 2017/11/20 下午 03:28:10.832 - ERRC_CELL_SELECT_IND: (00:00:19.359527): LAYER_RRC => LAYER_EMMSM: shared_nw_plmn_list: -

Log Information (3)Connection process

- **Check the UE log in the following figure**
- **Filter condition :** ERRC_EST、asn
- ERRC_EST_CNF -> **for retransmission**

```
1243> 2017/11/20 下午 03:27:58.680 - ERRC_EST_REQ: (00:00:07.183593): LAYER_EMMSM => LAYER_RRC: est_cause: (ORIGINATING_SIGNALLING_EST_CAUSE), plmn_id0: 0x64 (100)
est_cause: (ORIGINATING_SIGNALLING_EST_CAUSE), plmn_id0: 0x64 (100), plmn_id1: 0xF6 (246), plmn_id2: 0x10 (16)
mme_id: -
  plmn_id0: 0x80 (128), plmn_id1: 0x80 (128), plmn_id2: 0x01 (1), mme_group_id0: 0x01 (1), mme_group_id1: 0x00 (0), mme_code: 0xF4 (244)
gummei_type: (INVALID_GUMMEI_TYPE)
s_tmsi: -
  valid: True, mme_code: 0x68 (104), m_tmsi0: 0xD9 (217), m_tmsi1: 0x3F (63), m_tmsi2: 0x89 (137), m_tmsi3: 0xAD (173)
relay_node_active: False, msg_id: 0x00 (0)
nas_data: -
  len: 0x39 (57), ptr: 0x01018080 (16875648)
attach_without_pdn_connectivity: False
1425> 2017/11/20 下午 03:27:59.054 - ERRC_EST_CNF: (00:00:07.517974): LAYER_RRC => LAYER_EMMSM: msg_id: 0x00 (0)
```

Log Information (4)Attach process

- **Check the UE log in the following figure**
- **Filter condition :** dbg_N