

5 Network Service Commands

5.1. AT+COPS Operator Selection

This command returns information about the current operators and their status, and allows automatic or manual network selection.

The Test Command returns a set or sets of five parameters, each set representing an operator present in the network. Any of the formats may be unavailable and should then be an empty field. The list of operators shall be in the order of: home network, networks referenced in (U)SIM and other networks.

The Read Command returns the current network registration/deregistration mode and the currently selected operator. If no operator is selected, <format>, <oper> and <AcT> are omitted.

The Write Command forces an attempt to select and register the GSM/UMTS/EPS/5G network operator. If the selected operator is not available, no other operator shall be selected (except <mode>=4). The format of selected operator name shall apply to further Read Command (AT+COPS?).

AT+COPS Operator Selection	
Test Command AT+COPS=?	Response +COPS: [list of supported (<stat>,long alphanumeric <oper>,short alphanumeric <oper>,numeric <oper> [,<AcT>])s][,(range of supported <mode>s),(range of supported <format>s)] OK If there is any error: +CME ERROR: <err>
Read Command AT+COPS?	Response +COPS: <mode>[,<format>[,<oper>]][,<AcT>]] OK If there is any error related to MT functionality: +CME ERROR: <err>
Write Command	Response

AT+COPS=<mode>[,<format>[,<oper>[,<AcT>]]]	OK Or +CME ERROR: <err>
Maximum Response Time	180 s, determined by the network.
Characteristics	-
Reference 3GPP TS 27.007	

Parameter

<stat>	Integer type. Availability of operators. 0 Unknown 1 Operator available 2 Current operator 3 Operator forbidden
<oper>	String type. Operator in format as per <format> .
<mode>	Integer type. 0 Automatic operator selection (<oper> field is ignored). 1 Manual operator selection (<oper> field shall be present and <AcT> is optional) 2 Deregistration from network 3 Set only <format> (for AT+COPS? Read Command), and do not attempt registration/deregistration (<oper> and <AcT> fields are ignored). This value is invalid in the response of the Read Command. 4 Manual/automatic selection (<oper> field shall be present). If manual selection fails, automatic mode (<mode> =0) is entered.
<format>	Integer type. Format of <oper> . 0 Long format alphanumeric <oper> up to 16 characters. 1 Short format alphanumeric <oper> . 2 Numeric <oper> . GSM location area identification number.
<AcT>	Integer type. Access technology selected. Values 4, 5, 6 occur only in the response of the Read Command while MS is in data service state, and they are not intended for the Write Command of AT+COPS . 2 UTRAN 4 UTRAN W/HSDPA 5 UTRAN W/HSUPA 6 UTRAN W/HSDPA and HSUPA 7 E-UTRAN 10 E-UTRAN connected to 5GCN 11 NR connected to 5GCN 12 NG-RAN 13 E-UTRAN-NR dual connectivity
<err>	Error code. For more details, see Chapter 13.5 .

NOTE

1. When selecting 5G SA network, <AcT> should be set to 12, and when registering 5G SA network, <AcT> returned by **AT+COPS?** is 11.
2. Executing **AT+COPS=<mode>[,<format>[,<oper>[,<AcT>]]]** writes data to NVM. Please proceed with caution.

Example

```
AT+COPS=?                                //List all network operators present in the network.  
+COPS: (1,"CHN-UNICOM","UNICOM","46001",2),(1,"CHN-UNICOM","UNICOM","46001",12),(3,"C  
HINA MOBILE","CMCC","46000",7),(3,"CHN-CT","CT","46011",12),(3,"CHN-CT","CT","46011",7),(3,  
"CHINA MOBILE","CMCC","46000",12),,(0-4),(0-2)
```

OK

```
AT+COPS?                                //Query the currently selected network operator.  
+COPS: 0,0,"CHINA MOBILE",13
```

OK

5.2. AT+CREG Network Registration Status

The Read Command returns the presentation of URC (Unsolicited Result Code) and an integer <stat> which shows whether the network has currently indicated the registration of MT. Location information parameters <lac> and <ci> are returned only when <n>=2 and MT is registered on the network.

The Write Command sets whether to return an URC or not and controls the presentation of URC **+CREG: <stat>** when <n>=1 and there is a change in the MT network registration status.

AT+CREG Network Registration Status

Test Command

AT+CREG=?

Response

+CREG: (range of supported <n>s)

OK

Read Command

AT+CREG?

Response

+CREG: <n>,<stat>[,<lac>,<ci>[,<AcT>]]

OK

If there is any error:

+CME ERROR: <err>

Write Command AT+CREG=[<n>]	Response OK
Maximum Response Time	300 ms
Characteristics	-
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type 0 Disable network registration URC 1 Enable network registration URC: +CREG: <stat> 2 Enable network registration and location information URC: +CREG: <stat>[,<lac>,<ci>[,<AcT>]]
<stat>	Integer type. Circuit mode registration status. 0 Not registered. MT is not currently searching a new operator to register to. 1 Registered. Home network. 2 Not registered. MT is currently searching a new operator to register to. 3 Registration denied. 4 Unknown 5 Registered. Roaming.
<lac>	String type in hexadecimal format. Two-byte location area code.
<ci>	String type in hexadecimal format. 28-bit (UMTS/LTE) cell ID.
<AcT>	Integer type. Access technology selected. 2 UTRAN 4 UTRAN w/HSDPA 5 UTRAN w/HSUPA 6 UTRAN w/HSDPA and HSUPA 7 E-UTRAN 10 E-UTRAN connected to 5GCN (not supported currently) 11 NR connected to 5GCN (not supported currently) 12 NG-RAN (not supported currently) 13 E-UTRAN-NR dual connectivity
<err>	Error code. For more details, see Chapter 13.5 .

Example

```

AT+CREG=1
OK

+CREG: 1                                //URC reports that MT has registered on network.
AT+CREG=2                                //Activate extended URC mode.
OK

```

+CREG: 1,"D509","80D413D",7 //URC reports that operator has found location area code and cell ID.

5.3. AT+CGREG PS Network Registration Status

This command queries the PS network registration status and controls the presentation of URC +CGREG: <stat> when <n>=1 and there is a change in the MT's GPRS network registration status in GERAN/UTRAN, or URC +CGREG: <stat>[,,[<lac>],[<ci>],[<AcT>],[<rac>]] when <n>=2 and there is a change of the network cell in GERAN/UTRAN.

AT+CGREG PS Network Registration Status	
Test Command AT+CGREG=?	Response +CGREG: (list of supported <n>s)
	OK
Read Command AT+CGREG?	Response +CGREG: <n>,<stat>[,,[<lac>],[<ci>],[<AcT>],[<rac>]]
	OK
Write Command AT+CGREG=[<n>]	Response OK Or ERROR
Maximum Response Time	300 ms
Characteristics	-
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type. 0 Disable network registration URC. 1 Enable network registration URC: +CGREG:<stat> 2 Enable network registration and location information URC +CGREG: <stat>[,,[<lac>],[<ci>],[<AcT>],[<rac>]]
<stat>	Integer type. GPRS registration status. 0 Not registered. MT is not currently searching an operator to register to. The UE is in GMM state GMM-NUL or GMM-DEREGISTERED-INITIATED. The GPRS service is disabled; the UE is allowed to attach for GPRS if requested by the user. 1 Registered. Home network. The UE is in GMM state GMM-REGISTERED or

GMM-ROUTING-AREA-UPDATING-INITIATED INITIATED on the home PLMN.	
2	Not registered. MT is currently trying to attach or searching an operator to register to. The UE is in GMM state GMM-DEREGISTERED or GMM-REGISTERED-INITIATED. The GPRS service is enabled, but an allowable PLMN is currently not available. The UE will start a GPRS attach as soon as an allowable PLMN is available.
3	Registration denied. The UE is in GMM state GMM-NUL. The GPRS service is disabled; and the UE is not allowed to attach for GPRS if requested by the user.
4	Unknown
5	Registered. Roaming.
<lac>	String type. Two-byte location area code in hexadecimal format (e.g., "00C3" equals 195 in decimal).
<ci>	String type. Four-byte (UMTS/LTE) cell ID in hexadecimal format.
<AcT>	Access technology selected. 2 UTRAN 4 UTRAN W/HSDPA 5 UTRAN W/HSUPA 6 UTRAN W/HSDPA and HSUPA
<rac>	String type. One-byte routing area code in hexadecimal format.

Example

```
AT+CGREG=?  
+CGREG: (0-2)  
  
OK  
AT+CGREG=2  
OK  
AT+CGREG?  
+CGREG: 2,1,"D5D5","8054BBF",2,"0"  
  
OK  
  
+CGREG: 1,"D5D5","8054BBF",2,"0"
```

5.4. AT+CEREG EPS Network Registration Status

This command queries the network registration status and controls the presentation of URC **+CEREG:** **<stat>** when **<n>=1** and there is a change in the MT's EPS network registration status in E-UTRAN, or URC **+CEREG: <stat>,[<tac>],[<ci>],[<AcT>]]** when **<n>=2** and there is a change of the network cell in E-UTRAN.

AT+CEREG EPS Network Registration Status

Test Command AT+CEREG=?	Response +CEREG: (range of supported <n>s)
	OK
Read Command AT+CEREG?	Response +CEREG: <n>,<stat>[,<tac>,<ci>[,<AcT>]]
	OK
Write Command AT+CEREG=[<n>]	Response OK Or ERROR
Maximum Response Time	300 ms
Characteristics	-
Reference	3GPP TS 27.007

Parameter

<n>	Integer type. 0 Disable network registration URC 1 Enable network registration URC +CEREG:<stat> 2 Enable network registration and location information URC +CEREG: <stat>[,<tac>,<ci>[,<AcT>]]
<stat>	Integer type. EPS registration status. 0 Not registered, MT is not currently searching an operator to register to. 1 Registered. Home network. 2 Not registered, but MT is currently trying to attach or searching an operator to register to. 3 Registration denied. 4 Unknown 5 Registered. Roaming.
<tac>	String type. Two-byte tracking area code in hexadecimal format.
<ci>	String type. Four-byte (E-UTRAN) cell ID in hexadecimal format.
<AcT>	Access technology selected. 7 E-UTRAN 13 E-UTRAN-NR dual connectivity

Example

```

AT+CEREG=?
+CEREG: (0-2)

OK
AT+CEREG=2
OK
AT+CEREG?
+CEREG: 2,1,"DE10","5A29C0B",7

OK

+CEREG: 1,"DE10","5A29C0B",7

```

5.5. AT+C5GREG 5GS Network Registration Status

This command queries the network registration status and controls the presentation of URC **+C5GREG: <stat>** when **<n>=1** and there is a change in the MT's network registration status in 5GS.

It also controls the presentation of URC **+C5GREG: <stat>[,[<tac>],[<ci>],[<AcT>],[<Allowed_NSSAI_length>],[<Allowed_NSSAI>]]** when **<n>=2** and there is a change of the network cell in 5GS or when the network provides an allowed NSSAI. The parameters **<AcT>**, **<tac>**, **<ci>**, **<Allowed_NSSAI_length>** and **<Allowed_NSSAI>** are included only if available.

AT+C5GREG 5GS Network Registration Status

Test Command AT+C5GREG=?	Response +C5GREG: (range of supported <n>s) OK
Read Command AT+C5GREG?	Response +C5GREG: <n>,<stat>[,[<tac>],[<ci>],[<AcT>],[<Allowed_NSSAI_length>],[<Allowed_NSSAI>]] OK
Write Command AT+C5GREG=[<n>]	Response OK Or ERROR
Maximum Response Time	300 ms

Characteristics	-
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type. 0 Disable network registration URC 1 Enable network registration URC +C5GREG:<stat> 2 Enable network registration and location information URC +C5GREG: <stat>,[,<tac>],[<ci>],[<AcT>],[<Allowed_NSSAI_length>],[<Allowed_NSSAI>]]
<stat>	Integer type. NR registration status. 0 Not registered. MT is currently not searching an operator to register to. 1 Registered. Home network. 2 Not registered. MT is currently trying to attach or searching an operator to register to. 3 Registration denied. 4 Unknown 5 Registered. Roaming. 8 Registered for emergency services only.
<tac>	String type. Three-byte tracking area code in hexadecimal format.
<ci>	String type. Five-byte (NR) cell ID in hexadecimal format.
<AcT>	Integer type. Access technology selected. 10 E-UTRAN connected to 5GCN 11 NR connected to 5GCN
<Allowed_NSSAI_length>	Integer type. Number of octets of the <Allowed_NSSAI> information element.
<Allowed_NSSAI>	String type in hexadecimal format. Depending on the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of allowed S-NSSAIs received from the network. <Allowed_NSSAI> is coded as a list of <S-NSSAI>s separated by colons. See <S-NSSAI> in 3GPP 27.007 subclause 10.1.1. This parameter is not subject to conventional character conversion as per AT+CSCS .
<S-NSSAI>	String type in hexadecimal character format. Depending on the form, the string can be separated by dot(s) and semicolon(s). This parameter is associated with the PDU session for identifying a network slice in 5GS, see 3GPP TS 23.501 and 3GPP TS 24.501. For the format and the encoding of S-NSSAI, see also 3GPP TS 23.003. This parameter is not subject to conventional character conversion as per AT+CSCS . The parameter takes one of the following forms: sst only slice/service type (SST) is present. sst;mapped_sst SST and mapped configured SST are present. sst.sd SST and slice differentiator (SD) are present.

sst.sd;mapped_sst	SST, SD and mapped configured SST are present
sst.sd;mapped_sst.mapped_sd	SST, SD, mapped configured SST and mapped configured SD are present.

Example

```
AT+C5GREG=?
+C5GREG: (0-2)

OK
AT+C5GREG=2
OK
AT+C5GREG?
+C5GREG: 2,1,"690E0F","9013B004",11,4,"01.000000"

OK
+C5GREG: 1,"690E0F","9013B004",11,4,"01.000000"
```

5.6. AT+CGDCONT Define PDP Context

This command specifies PDP context parameters for a specific context **<cid>**. A special form of the Write Command (**AT+CGDCONT=<cid>**) causes the values for **<cid>** to become undefined. It is not allowed to change the definition of an already activated context.

This Read Command returns the current configurations for each defined PDP context.

AT+CGDCONT Define PDP Context

Test Command

AT+CGDCONT=?

Response

+CGDCONT: (range of supported **<cid>**s),**<PDP_type>**,**<APN>**,**<PDP_addr>**,(list of supported **<d_comp>**s),(list of supported **<h_comp>**s)[,(list of supported **<IPv4AddrAlloc>**s)[,(list of supported **<request_type>**s)[,(list of supported **<SSC_mode>**s)[,(list of supported **<NSSAI>**s)[,(list of supported **<Pref_access_type>**s)[,(list of supported **<Always-on_req>**s)]]]]]]

OK

Read Command AT+CGDCONT?	Response +CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<IPv4AddrAlloc>[,<request_type>,,,,,[,<SSC_mode>[,<S-NSSAI>[,<Pref_access_type>,,[,<Always-on_req>]]]]]] [...]
	OK
Write Command AT+CGDCONT=[<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>[,<IPv4AddrAlloc>[,<request_type>,,,,[,<SSC_mode>[,<S-NSSAI>[,<Pref_access_type>,,[,<Always-on_req>]]]]]]]]]]]	Response OK Or ERROR
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are saved automatically.
Reference 3GPP TS 27.007	

Parameter

<cid>	Integer type. PDP context identifier, which specifies a particular PDP context definition. Range: 1–42. The parameter is local to the TE-MT interface and is used in other PDP context-related commands.
<PDP_type>	String type. Packet data protocol type. "IP" IPv4. Internet protocol (see IETF STD 5) "PPP" Point to Point protocol (see IETF STD 51) "IPV6" Internet protocol, version 6 (see RFC 2460) "IPV4V6" Virtual <PDP_type> introduced to handle dual IP stack UE capability (see 3GPP TS 24.301)
<APN>	String type. Access point name, which is a logical name used to select GGSN or the external packet data network. If the value is null or omitted, the subscription value will be requested.
<PDP_addr>	String type. It identifies the MT in the address space applicable to the PDP. If the value is null or omitted, a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested. The allocated address may be read using AT+CGPADDR (see <i>Chapter 9.4</i>).
<d_comp>	Integer type. It controls PDP data compression (applicable for SNDCP only) (see 3GPP TS 44.065). 0 Off 2 V.42bis

<h_comp>	Integer type. It controls PDP header compression (see <i>3GPP TS 44.065 and 3GPP TS 25.323</i>). 0 Off 4 RFC3095
<IPv4AddrAlloc>	Integer type. It controls how the MT/TA requests to get the IPv4 address information. 0 IPv4 address allocation through NAS signaling 1 IPv4 address allocated through DHCP
<request_type>	Integer type. Type of PDP context activation request. 0 PDP context is for a new PDP context establishment or for a handover from a non-3GPP access network (how the MT decides whether the PDP context is for a new PDP context establishment or for a handover is implementation specific). 1 PDP context is for emergency bearer services.
<SSC_mode>	Integer type. It indicates the session and service continuity (SSC) mode for the PDU session in 5GS, see <i>3GPP TS 23.501</i> . 0 PDU session is associated with SSC mode 1 1 PDU session is associated with SSC mode 2 2 PDU session is associated with SSC mode 3
<S-NSSAI>	String type in hexadecimal character format. Depending on the form, the string can be separated by dot(s) and semicolon(s). This parameter is associated with the PDU session for identifying a network slice in 5GS, see <i>3GPP TS 23.501 and 3GPP TS 24.501</i> . For the format and the encoding of S-NSSAI, see also <i>3GPP TS 23.003</i> . This parameter is not subject to conventional character conversion as per AT+CSCS . The parameter takes one of the following forms: sst only slice/service type (SST) is present sst;mapped_sst SST and mapped configured SST are present sst.sd SST and slice differentiator (SD) are present sst.sd;mapped_sst SST, SD and mapped configured SST are present sst.sd;mapped_sst.mapped_sd SST, SD, mapped configured SST and mapped configured SD are present
<Pref_access_type>	Integer type. Preferred access type for the PDU session in 5GS. See <i>3GPP TS 23.501</i> and <i>3GPP TS 24.501</i> . 0 Preferred access type is 3GPP access 1 Preferred access type is non-3GPP access
<Always-on_req>	Integer type. It indicates whether the UE requested to establish the PDU session as an always-on PDU session, see <i>3GPP TS 24.501</i> . 0 Always-on PDU session was not requested 1 Always-on PDU session was requested

NOTE

Executing
AT+CGDCONT=[<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>[,<IPv4AddrAlloc>[,<request_type>,,,,,,[,<SSC_mode>[,<S-NSSAI>[,<Pref_access_type>,,,[,<Always-on_req>]

5.7. AT+C5GNSSAI 5GS NSSAI Setting

This command enables updating the default NSSAI configuration stored at MT.

AT+C5GNSSAI 5GS NSSAI Setting	
Test Command AT+C5GNSSAI=?	Response +C5GNSSAI: (range of supported <default_configured_nssai_length>s),(list of supported <default_configured_nssai>s) OK
Read Command AT+C5GNSSAI?	Response +C5GNSSAI: [<default_configured_nssai_length>,<default_configured_nssai>] OK
Write Command AT+C5GNSSAI=<default_configured_nssai_length>,<default_configured_nssai>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	-
Reference 3GPP TS 27.007	

Parameter

<code><default_configured_nssai_length></code>	Integer type. Default configured NSSAI length in octets to be stored in MT.
<code><default_configured_nssai></code>	String type in hexadecimal format. Depending on the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of S-NSSAIs included in the default configured NSSAI to be stored in MT. <code><default_configured_nssai></code> is coded as a list of <code><S-NSSAI></code>

separated by colon(s). See **<S-NSSAI>** in *subclause 10.1.1*.

This parameter is not subject to conventional character conversion as per **AT+CSCS**.

<err>

Error code. For more details, see **Chapter 13.5**.

NOTE

1. If the value is an empty string (""), no default configured NSSAI is stored in MT.
2. Executing **AT+C5GNSSAI=<default_configured_nssai_length>,<default_configured_nssai>** writes data to NVM. Please proceed with caution.

5.8. AT+C5GNSSAIRDP Read 5GS NSSAI Dynamic Parameters

This command returns the default configured NSSAI, rejected NSSAI for 3GPP access or non-3GPP access stored in MT. The execution command returns the default configured NSSAI, rejected NSSAI for 3GPP access and rejected NSSAI for non-3GPP access stored at the MT, if any, as well as the configured NSSAI, allowed NSSAI for 3GPP access and allowed NSSAI for non-3GPP access stored at the MT, if any for the PLMN identified by **<plmn_id>**.

AT+C5GNSSAIRDP Read 5GS NSSAI Dynamic Parameters

Test Command

AT+C5GNSSAIRDP=?

Response

+C5GNSSAIRDP: (range of supported **<nssai_type>**s),(list of supported **<plmn_id>**s)

OK

Write Command

AT+C5GNSSAIRDP=<nssai_type>,<plmn_id>

Response

[+C5GNSSAIRDP: [<default_configured_nssai_length>,<default_configured_nssai>[,<rejected_nssai_3gpp_length>,<rejected_nssai_3gpp>[,<rejected_nssai_non3gpp_length>,<rejected_nssai_non3gpp>]]]

[+C5GNSSAIRDP: <plmn_id>[,<configured_nssai_length>,<configured_nssai>[,<allowed_nssai_3gpp_length>,<allowed_nssai_3gpp>,<allowed_nssai_non3gpp_length>,<allowed_nssai_non3gpp>]]]

[+C5GNSSAIRDP: <plmn_id>[,<configured_nssai_length>,<configured_nssai>[,<allowed_nssai_3gpp_length>,<allowed_nssai_3gpp>,<allowed_nssai_non3gpp_length>,<allowed_nssai_non3gpp>]]

[...]]]

OK

Maximum Response Time	300 ms
Characteristics	-
Reference 3GPP TS 27.007	

Parameter

<nssai_type>	Integer type. Type of NSSAI to be returned. Return stored default configured NSSAI only Return stored default configured NSSAI and rejected NSSAI(s) Return stored default configured NSSAI, rejected NSSAI(s), and configured NSSAI(s) Return stored default configured NSSAI, rejected NSSAI(s), configured NSSAI(s), and allowed NSSAI(s)
<plmn_id>	String type. MCC and MNC of the PLMN to which the NSSAI information applies. For the format and the encoding of the MCC and MNC, see <i>3GPP TS 23.003</i> . This parameter is not subject to conventional character conversion as per AT+CSCS .
<default_configured_nssai_length>	Integer type. Length in octets of the default configured NSSAI stored in MT.
<default_configured_nssai>	String type in hexadecimal format. Depending on the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of S-NSSAIs included in the default configured NSSAI stored in MT for the PLMN. The <default_configured_nssai> is coded as a list of <S-NSSAI> s separated by colon(s). See <S-NSSAI> in <i>3GPP 27.007 subclause 10.1.1</i> . This parameter is not subject to conventional character conversion as per AT+CSCS .
<rejected_nssai_3gpp_length>	Integer type. Length in octets of the rejected NSSAI associated with 3GPP access stored in MT for the serving PLMN.
<rejected_nssai_3gpp>	String type in hexadecimal format. Depending on the form, the string can be separated by dot(s), colon(s) and hash(es). This parameter indicates the list of rejected S-NSSAIs associated with 3GPP access stored in MT for the serving PLMN. The <rejected_nssai_3gpp> is coded as a list of rejected <S-NSSAI> s separated by colon(s). For the format and the encoding of <S-NSSAI> , see also <i>3GPP TS 23.003</i> . This parameter is not subject to conventional character conversion as per AT+CSCS . Rejected S-NSSAI takes one of the forms: sst#cause only slice/service type (SST) and reject

		cause are present
sst.sd#cause	SST and slice differentiator (SD) and reject	
	cause are present where the cause is a	
	cause value according to 3GPP TS 24.501	
	<i>Table 9.11.3.46.1.</i>	
<rejected_nssai_non3gpp_length>	Integer type. Length in octets of the rejected NSSAI associated with non-3GPP access stored in MT for the serving PLMN.	
<rejected_nssai_non3gpp>	String type in hexadecimal format. Depending on the form, the string can be separated by dot(s), colon(s) and hash(es). This parameter indicates the list of rejected S-NSSAIs associated with non-3GPP access stored in MT for the serving PLMN. The <rejected_nssai_non3gpp> is coded as a list of rejected <S-NSSAI> s separated by colon(s). For the format and the encoding of <S-NSSAI> , see also 3GPP TS 23.003. This parameter is not subject to conventional character conversion as per AT+CSCS . The rejected S-NSSAI takes one of the following forms:	
sst#cause	only slice/service type (SST) and reject cause are present	
sst.sd#cause	SST and slice differentiator (SD) and reject cause are present where cause is a cause value is according to 3GPP TS 24.501 <i>table 9.11.3.46.1.</i>	
<configured_nssai_length>	Integer type. Length in octets of the configured NSSAI stored in MT for the PLMN identified by <plmn_id> .	
<configured_nssai>	String type in hexadecimal format. Depending on the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of configured S-NSSAIs stored in MT for the PLMN identified by <plmn_id> . The <configured_nssai> is coded as a list of <S-NSSAI> s separated by colon(s). See <S-NSSAI> in 3GPP 27.007 subclause 10.1.1. This parameter is not subject to conventional character conversion as per AT+CSCS .	
<allowed_nssai_3gpp_length>	Integer type. Length in octets of the allowed NSSAI associated with 3GPP access stored in MT for the PLMN identified by <plmn_id> .	
<allowed_nssai_3gpp>	String type in hexadecimal format. Depending on the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of allowed S-NSSAIs associated with 3GPP access stored in MT for the PLMN identified by <plmn_id> . The <allowed_nssai_3gpp> is coded as a list of <S-NSSAI> s separated by colon(s). See <S-NSSAI> in 3GPP 27.007 subclause 10.1.1. This parameter is not subject to conventional character conversion as per AT+CSCS .	
<allowed_nssai_non3gpp_length>	Integer type. Length in octets of the allowed NSSAI associated with non-3GPP access stored in MT for the PLMN identified by <plmn_id> .	

<allowed_nssai_non3gpp>	String type in hexadecimal format. Depending on the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of allowed S-NSSAIs associated with non-3GPP access stored in MT for the PLMN identified by <plmn_id> . The <allowed_nssai_non3gpp> is coded as a list of <S-NSSAI> s separated by colon(s). See <S-NSSAI> in <i>3GPP 27.007 subclause 10.1.1</i> . This parameter is not subject to conventional character conversion as per AT+CSCS .
<S-NSSAI>	String type in hexadecimal character format. Depending on the form, the string can be separated by dot(s) and semicolon(s). This parameter is associated with the PDU session for identifying a network slice in 5GS, see <i>3GPP TS 23.501 and 3GPP TS 24.501</i> . For the format and the encoding of S-NSSAI, see also <i>3GPP TS 23.003</i> . This parameter is not subject to conventional character conversion as per AT+CSCS . The parameter takes one of the following forms: sst only slice/service type (SST) is present. sst;mapped_sst SST and mapped configured SST are present sst.sd SST and slice differentiator (SD) are present. Sst.sd;mapped_sst SST, SD and mapped configured SST are present. sst.sd;mapped_sst.mapped_sd SST, SD, mapped configured SST and mapped configured SD are present.

5.9. AT+CSQ Signal Quality Report

This command indicates the received signal strength **<RSSI>** and the channel bit error rate **<ber>**. This Test Command returns values supported by MT. This Execution Command returns the received signal strength indication **<RSSI>** and the channel bit error rate **<ber>** from MT.

AT+CSQ Signal Quality Report	
Test Command AT+CSQ=?	Response +CSQ: (list of supported <RSSI>s),(list of supported <ber>s)
	OK
Execution Command AT+CSQ	Response +CSQ: <RSSI>,<ber>
	OK
	If there is any error: +CME ERROR: <err>
Maximum Response Time	300 ms

Characteristics	-
Reference 3GPP TS 27.007	

Parameter

<RSSI>	Integer type. Received signal strength indication. 0 -113 dBm or less 1 -111 dBm 2–30 -109 dBm to -53 dBm 31 -51 dBm or greater 99 Unknown or not detectable
<ber>	Integer type. Channel bit error rate (in percent). 0–7 As RxQual values in the table in 3GPP TS 45.008 subclause 8.2.4 99 Unknown or not detectable
<err>	Error code. For more details, see Chapter 13.5 .

Example

```
AT+CSQ=?  
+CSQ: (0-31,99),(0-7,99)  
  
OK  
AT+CSQ  
+CSQ: 28,99  
//The current signal strength indication is 28 and the channel bit error rate is unknown or not detectable.  
  
OK
```

NOTE

1. After using network-related commands such as **AT+CCWA** and **AT+CCFC**, it is recommended to wait for 3 s before entering **AT+CSQ** to ensure that any network access required for the preceding command has been completed.
2. This command only takes effect under WCDMA and LTE, and does not apply to 5G.

5.10. AT+QRSRP Report RSRP

The command queries and reports the RSRP of the current service network.

AT+QRSRP Report RSRP	
Test Command AT+QRSRP=?	Response OK
Execution Command AT+QRSRP	Response +QRSRP: <PRX>,<DRX>,<RX2>,<RX3>,<sysmode> OK
Maximum Response Time	300 ms
Characteristics	-

Parameter

<PRX>	Integer type. PRX path RSRP value. Range: -140 to -44 dBm.
<DRX>	Integer type. DRX path RSRP value. Range: -140 to -44 dBm.
<RX2>	Integer type. RX2 path RSRP value. Range: -140 to -44 dBm.
<RX3>	Integer type. RX3 path RSRP value. Range: -140 to -44 dBm.
<sysmode>	String type. It indicates the service mode in which the MT will report the RSRP. LTE LTE mode NR5G 5G mode

NOTE

1. This command is only supported in LTE and 5G.
2. If the queried **<PRX>**, **<DRX>**, **<RX2>** or **<RX3>** is -32768, it indicates that the RSRP value is invalid.
3. This command is strongly related to the RF link and is generally only used for customer reference and cannot be used as a sensitivity test. In addition, it is best to use it when measuring the speed, the results are more accurate.

Example

```
AT+QRSRP      //Query RSRP.
+QRSRP: -101,-105,-105,-99,LTE
OK
```

5.11. AT+QRSRQ Report RSRQ

The command queries and reports the RSRQ of the current service network.

AT+QRSRQ Report RSRQ	
Test Command AT+QRSRQ=?	Response OK
Read Command AT+QRSRQ	Response +QRSRQ: <PRX>,<DRX>,<RX2>,<RX3>,<sysmode> OK If there is any error: ERROR
Maximum Response Time	300 ms
Characteristics	-

Parameter

<PRX>	Integer type. PRX path RSRQ value. Range: -20 to -3 dB.	
<DRX>	Integer type. DRX path RSRQ value. Range: -20 to -3 dB.	
<RX2>	Integer type. RX2 path RSRQ value. Range: -20 to -3 dB.	
<RX3>	Integer type. RX3 path RSRQ value. Range: -20 to -3 dB.	
<sysmode>	String type. It indicates the service mode in which the MT will report the RSRQ.	
	LTE	LTE mode
	NR5G	5G mode

NOTE

1. This command is only supported in LTE and 5G.
2. If the queried **<PRX>**, **<DRX>**, **<RX2>** or **<RX3>** is -32768, it indicates that the RSRQ value is invalid.
3. This command is strongly related to the RF link and is generally only used for customer reference and cannot be used as a sensitivity test. In addition, it is best to use it when measuring the speed, the results are more accurate.

Example

AT+QRSRQ //Query RSRQ.

+QRSRQ: -16,-19,-19,-15,LTE

OK

5.12. AT+QSINR Report SINR

The command queries and reports the SINR of the current service network.

AT+QSINR Report SINR	
Test Command AT+QSINR=?	Response OK
Read Command AT+QSINR?	Response +QSINR: <PRX>,<DRX>,<RX2>,<RX3>,<sysmode> OK
Execution Command AT+QSINR	Response +QSINR: <PRX>,<DRX>,<RX2>,<RX3>,<sysmode> OK If there is any error: ERROR
Maximum Response Time	300 ms
Characteristics	-

Parameter

<PRX>	Integer type. PRX path SINR value. Range: -20 to 30 dB in LTE, -23 to 40 dB in 5G.
<DRX>	Integer type. DRX path SINR value. Range: -20 to 30 dB in LTE, -23 to 40 dB in 5G.
<RX2>	Integer type. RX2 path SINR value. Range: -20 to 30 dB in LTE, -23 to 40 dB in 5G.
<RX3>	Integer type. RX3 path SINR value. Range: -20 to 30 dB in LTE, -23 to 40 dB in 5G.
<sysmode>	String type. It indicates the service mode in which the MT will report the SINR. LTE LTE mode NR5G 5G mode

NOTE

1. This command is only supported in LTE and 5G.
2. If the queried **<PRX>**, **<DRX>**, **<RX2>** or **<RX3>** is -32768, it indicates that the SINR value is invalid.
3. This command is strongly related to the RF link and is generally only used for customer reference and cannot be used as a sensitivity test. In addition, it is best to use it when measuring the speed, the results are more accurate.

Example

```
AT+QSINR      //Query SINR.
+QSINR: -3,-7,-1,-2,LTE
```

```
OK
```

5.13. AT+CPOL Preferred Operator List

This command edits and queries the list of preferred operators.

AT+CPOL Preferred Operator List	
Test Command AT+CPOL=?	Response +CPOL: (list of supported <index>s),(range of supported <format>s) OK
Read Command Query the list of preferred operators: AT+CPOL?	Response +CPOL: <index>,<format>,<oper>[,<GSM>,<GSM_compact>,<UTRAN>,<E-UTRAN>,<NG-RAN>] [...] OK
Write Command Edit the list of preferred operators: AT+CPOL=<index>[,<format>[,<oper>[<GSM>,<GSM_compact>,<UTRAN>,<E-UTRAN>,<NG-RAN>]]]	Response OK Or ERROR If there is any error related to MT functionality: +CME ERROR: <err> If <index> is given but <oper> is omitted, the entry is deleted.
Maximum Response Time	300 ms
Characteristics	-
Reference	
3GPP TS 27.007	

Parameter

<index>	Integer type. Order number of the operator in the (U)SIM preferred operator list.
<format>	Integer type. Format of operator name.

	0	Long format alphanumeric <oper>
	1	Short format alphanumeric <oper>
	2	Numeric <oper>
<oper>		String type. Operation name. <format> indicates if the format is alphanumeric or numeric (see AT+COPS).
<GSM>		Integer type. GSM access technology selection.
	0	Not selected
	1	Selected
<GSM_compact>		Integer type. GSM compact access technology selection.
	0	Not selected
	1	Selected
<UTRAN>		Integer type. UTRAN access technology selection.
	0	Not selected
	1	Selected
<E-UTRAN>		Integer type. E-UTRAN access technology selection.
	0	Not selected
	1	Selected
<NG-RAN>		Integer type. NG-RAN access technology selection.
	0	Not selected
	1	Selected
<err>		Error code. For more details, see Chapter 13.5 .

NOTE

The access technology selection parameters <GSM>, <GSM_compact>, <UTRAN> and <E-UTRAN> are required for (U)SIM card or UICC's containing PLMN selector with access technology.

5.14. AT+COPN Read Operator Names

This command returns the list of supported operator names from MT. Each operator code <numericn> that has an alphanumeric equivalent <alphan> in the MT memory is returned.

AT+COPN Read Operator Names

Test Command AT+COPN=?	Response OK
Execution Command AT+COPN	Response +COPN: <numeric1>,<alpha1> [+COPN: <numeric2>,<alpha2> [...]] OK

	If there is error related to MT functionality: +CME ERROR: <err>
Maximum Response Time	Determined by the number of operator names.
Characteristics	-
Reference 3GPP TS 27.007	

Parameter

<numeric>	String type. Operator name in numeric format (see AT+COPS).
<alpha>	String type. Operator name in long alphanumeric format (see AT+COPS).
<err>	Error code. For more details, see Chapter 13.5 .

5.15. AT+CTZU Automatic Time Zone Update

This command enables/disables automatic time zone update via NITZ.

AT+CTZU Automatic Time Zone Update	
Test Command AT+CTZU=?	Response +CTZU: (list of supported <onoff>s)
	OK
Write Command AT+CTZU=<onoff>	Response OK Or ERROR
Read Command AT+CTZU?	Response +CTZU: <onoff>
	OK
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.
Reference 3GPP TS 27.007	

Parameter

<onoff> Integer type. Enable or disable automatic time zone update.

0 Disable

1 Enable

NOTE

Executing **AT+CTZU=<onoff>** writes data to NVM. Please proceed with caution.

Example

```
AT+CTZU?      //Read command.  
+CTZU: 0  
  
OK  
AT+CTZU=?    //Test command.  
+CTZU: (0,1)  
  
OK  
AT+CTZU=1    //Enable automatic time zone update.  
OK  
AT+CTZU?  
+CTZU: 1  
  
OK
```

5.16. AT+CTZR Time Zone Reporting

This command controls time zone change event reporting. If reporting is enabled, MT returns URC **+CTZV: <tz>** or **+CTZE: <tz>,<dst>,<time>** whenever the time zone is changed.

AT+CTZR Time Zone Reporting

Test Command

AT+CTZR=?

Response

+CTZR: (range of supported <reporting>s)

OK

Read Command

AT+CTZR?

Response

+CTZR: <reporting>

OK

Write Command AT+CTZR=<reporting>	Response OK Or ERROR
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.
Reference 3GPP TS 27.007	

Parameter

<reporting>	Integer type. Disable or enable time zone reporting. 0 Disable 1 Enable time zone change event reporting by URC +CTZV: <tz> 2 Enable extended time zone change event reporting by URC +CTZE: <tz>,<dst>,<time>
<tz>	String type. Sum of local time zone and daylight saving time (difference between local time and GMT is expressed in quarter(s) of an hour). Format: "±zz", where "zz" is a fixed width, two-digit integer with the range -48 to +56. To maintain a fixed width, numbers in range -9 to +9 are expressed with a leading zero, e.g. "-09", "+00" and "+09".
<dst>	Integer type. It indicates whether <tz> includes daylight saving time adjustment. 0 <tz> does not include adjustment for daylight saving time 1 <tz> includes +1 hour adjustment (equivalent to 4 quarters in <tz>) for daylight saving time 2 <tz> includes +2 hours adjustment (equivalent to 8 quarters in <tz>) for daylight saving time
<time>	String type. Local time. Format: "YYYY/MM/DD, hh:mm:ss", expressed as integers representing year (YYYY), month (MM), date (DD), hour (hh), minute (mm) and second (ss). This parameter can be provided by the network when delivering time zone information and will be presented in URC of extended time zone change event reporting if provided by the network.

NOTE

Executing **AT+CTZR=<reporting>** writes data to NVM. Please proceed with caution.

Example

```
AT+CTZR=2
OK
AT+CTZR?
```

```
+CTZR: 2
```

OK

```
+CTZE: "+32",0,"2018/03/23,06:51:13" //Extended time zone and local time reporting by URC.
```

5.17. AT+QLTS Obtain Latest Time Synchronized Through Network

The Execution Command returns the latest time synchronized through the network.

AT+QLTS Obtain Latest Time Synchronized Through Network

Test Command AT+QLTS=?	Response +QLTS: (range of supported <mode>s)
	OK
Write Command AT+QLTS=<mode>	Response +QLTS: <time>,<ds>
	OK
	If there is any error: ERROR Or +CME ERROR: <err>
Execution Command AT+QLTS	Response +QLTS: <time>,<ds>
	OK
	If there is any error: ERROR
Maximum Response Time	300 ms
Characteristics	-

Parameter

- <mode>** Integer type. Query network time mode.
- 0 Query the latest time that has been synchronized through network
 - 1 Query the current GMT time calculated from the latest time that has been synchronized through network

2	Query the current local time calculated from the latest time that has been synchronized through network
<time>	String type. Format is "yyyy/MM/dd,hh:mm:ss±zz", where characters represent year month, day, hour, minute, second and time zone (indicating the difference, expressed in quarter(s) of an hour, between local time and GMT; range: -48 to +48). E.g., 6th of May 2004, 22:10:00 GMT+2 equals "2004/05/06,22:10:00+08".
<ds>	Integer type. Daylight saving time. 0 No adjustment 1 Plus one hour 2 Plus two hours
<err>	Error code. For more details, see Chapter 13.5 .

NOTE

If the time has not been synchronized through network, the command returns **+QLTS: ""**.

Example

```
AT+QLTS=?          //Query supported network time modes.  
+QLTS: (0-2)  
  
OK  
AT+QLTS          //Query the latest time synchronized through network.  
+QLTS: "2017/01/13,03:40:48+32",0  
  
OK  
AT+QLTS=0          //Query the latest time synchronized through network. It offers the same  
                   function as the Execution Command AT+QLTS.  
+QLTS: "2017/01/13,03:40:48+32",0  
  
OK  
AT+QLTS=1          //Query the current GMT time calculated from the latest time that has been  
                   synchronized through network.  
+QLTS: "2017/01/13,03:41:22+32",0  
  
OK  
AT+QLTS=2          //Query the current local time calculated from the latest time that has been  
                   synchronized through network.  
+QLTS: "2017/01/13,11:41:23+32",0
```

5.18. AT+QNWINFO Query Network Information

This command queries network information such as the selected access technology, the operator and the selected band.

AT+QNWINFO Query Network Information	
Test Command AT+QNWINFO=?	Response OK
Execution Command AT+QNWINFO	Response +QNWINFO: <AcT>,<oper>,<band>,<channel> [+QNWINFO: <AcT>,<oper>,<band>,<channel>] OK
Maximum Response Time	300 ms
Characteristics	-

Parameter

<AcT>	String type. Selected access technology. "NONE" "WCDMA" "TDD LTE" "FDD LTE" "TDD NR5G" "FDD NR5G"
<oper>	String type. Operator name in numeric format without double quotes.
<band>	String type. Selected band. "WCDMA_I_2100" "WCDMA_II_1900" "WCDMA_III_1800" "WCDMA_IV_1700_US" "WCDMA_V_850" "WCDMA_VI_800" "WCDMA_VII_2600" "WCDMA_VIII_900" "WCDMA_IX_1700_JAPAN" "WCDMA_XI_1500" "WCDMA_XIX_850_JAPAN" "LTE BAND 1"–"LTE BAND 43" "LTE BAND 46"–"LTE BAND49" "LTE BAND 66"–"LTE BAND 68"

"LTE BAND 71"
"LTE BAND 125"–"LTE BAND 127"
"LTE BAND 250"
"LTE BAND 252"
"LTE BAND 255"
"NR5G BAND 1"–"NR5G BAND 3"
"NR5G BAND 5"
"NR5G BAND 7"–"NR5G BAND 8"
"NR5G BAND 12"
"NR5G BAND 14"
"NR5G BAND 20"
"NR5G BAND 25"
"NR5G BAND 28"
"NR5G BAND 34"
"NR5G BAND 38"–"NR5G BAND 41"
"NR5G BAND 48"
"NR5G BAND 50"–"NR5G BAND 51"
"NR5G BAND 65"–"NR5G BAND 66"
"NR5G BAND 70"–"NR5G BAND 71"
"NR5G BAND 74"–"NR5G BAND 86"
"NR5G BAND 257"–"NR5G BAND 261"

<channel> Integer type. Channel ID.

NOTE

If the device has not been registered on network, the command returns **+QNWINFO: No Service**. For 5G NSA, it returns both LTE and 5G information.

Example

```
AT+QNWINFO=?  
OK  
AT+QNWINFO  
+QNWINFO: "FDD LTE",46001,"LTE BAND 3",1650  
OK
```

5.19. AT+QSPN Query Service Provider Name

This command queries the service provider name.

AT+QSPN Query Service Provider Name	
Test Command AT+QSPN=?	Response OK
Execution Command AT+QSPN	Response +QSPN: <FNN>,<SNN>,<SPN>,<alphabet>,<RPLMN> OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	-

Parameter

<FNN>	String type. Full name of network.
<SNN>	String type. Shortened name of network.
<SPN>	String type. Service provider name.
<alphabet>	Integer type. Alphabet of full and shortened network name. 0 GSM 7-bit default alphabet 1 UCS2
<RPLMN>	String type. Registered PLMN.

NOTE

1. If **<alphabet>** is 0, **<FNN>** and **<SNN>** are shown in GSM 7-bit default alphabet string.
2. If **<alphabet>** is 1, **<FNN>** and **<SNN>** are shown in UCS2 hexadecimal string.
3. If network is not registered, **AT+QSPN** returns **OK**.

Example

AT+QSPN //Query the service provider name.

+QSPN: "CHN-UNICOM","UNICOM","","0,"46001"

OK

5.20. AT+QENG Query Primary Serving Cell and Neighbour Cell Information

This command obtains the network information, such as serving cell and neighbour cell.

AT+QENG Query Primary Serving Cell and Neighbour Cell Information

Test Command	Response
AT+QENG=?	+QENG: (list of supported <cell_type>s) OK
Write Command Query the serving cell information AT+QENG="servingcell"	Response In SA mode: +QENG: "servingcell",<state>,"NR5G-SA",<duplex_mod e>,<MCC>,<MNC>,<cellID>,<PCID>,<TAC>,<ARFCN>,<ba nd>,<NR_DL_bandwidth>,<RSRP>,<RSRQ>,<SINR>,<sc s>,<srxlev> OK In EN-DC mode: +QENG: "servingcell",<state> +QENG: "LTE",<is_tdd>,<MCC>,<MNC>,<cellID>,<PCID>,<earfcn>,<freq_band_ind>,<UL_bandwidth>,<DL_bandwi dth>,<TAC>,<RSRP>,<RSRQ>,<RSSI>,<SINR>,<CQI>,<tx _power>,<srxlev> +QENG: "NR5G-NSA",<MCC>,<MNC>,<PCID>,<RSRP>,<SINR>,<RSRQ>,<ARFCN>,<band>,<NR_DL_bandwidth>,<scs> OK In LTE mode: +QENG: "servingcell",<state>,"LTE",<is_tdd>,<MCC>,<M NC>,<cellID>,<PCID>,<earfcn>,<freq_band_ind>,<UL_ba ndwidth>,<DL_bandwidth>,<TAC>,<RSRP>,<RSRQ>,<RS I>,<SINR>,<CQI>,<tx_power>,<srxlev> OK In WCDMA mode: +QENG: "servingcell",<state>,"WCDMA",<MCC>,<MNC>,<LAC>,<cellID>,<uarfcn>,<PSC>,<RAC>,<RSCP>,<ecio>,

	<phych>,<SF>,<slot>,<speech_code>,<comMod>
	OK
Write Command Query the information of neighbour cells AT+QENG="neighbourcell"	Response In LTE mode: [+QENG: "neighbourcell intra","LTE",<earfcn>,<PCID>,<RSRQ>,<RSRP>,<RSSI>,<SINR>,<srxlev>,<cell_resel_priority>,<s_non_intra_search>,<thresh_serving_low>,<s_intra_search>] [...] [+QENG: "neighbourcell inter","LTE",<earfcn>,<PCID>,<RSRQ>,<RSRP>,<RSSI>,<SINR>,<srxlev>,<cell_resel_priority>,<threshX_low>,<threshX_high>] [...] [+QENG:"neighbourcell","WCDMA",<uarfcn>,<cell_resel_priority>,<thresh_Xhigh>,<thresh_Xlow>,<PSC>,<RSC_P><ecno>,<srxlev>] [...]
	OK
	In WCDMA mode: [+QENG:"neighbourcell","WCDMA",<uarfcn>,<srxqual>,<PSC>,<RSCP>,<ecno>,<set>,<rank>,<srxlev>] [...] [+QENG: "neighbourcell","LTE",<earfcn>,<PCID>,<RSRQ>,<RSRP>,<srxlev>] [...]
	OK
	If there is any error: ERROR
Maximum Response Time	300 ms
Characteristics	-

Parameter

<cell_type>	String type. Information of different cells. "servingcell" Information of 3G/4G/5G serving cells "neighbourcell" Information of 3G/4G neighbor cells
<state>	String type. UE state.

	"SEARCH" UE is searching but cannot (yet) find a suitable 3G/4G/5G cell.
	"LIMSRV" UE is camping on a cell but has not registered on the network.
	"NOCONN" UE is camping on a cell and has registered on the network, and it is in idle mode.
	"CONNECT" UE is camping on a cell and has registered on the network, and a call is in progress.
<duplex_mode>	String type. 5G SA network mode. "TDD" "FDD"
<MCC>	16-bit unsigned integer. Mobile country code (first part of the PLMN code).
<MNC>	16-bit unsigned integer. Mobile network code (second part of the PLMN code).
<cellID>	Integer type. Cell ID. 28-bit (UMTS, LTE) or 36-bit (5G) cell ID. Range: 0-0xFFFFFFFF.
<PCID>	Integer type. Physical cell ID.
<TAC>	String type. Two-byte tracking area code for LTE or three-byte tracking area code for 5G SA in hexadecimal format without double quotes (see <i>3GPP 23.003 Section 19.4.2.3</i>).
<ARFCN>	Integer type. SA-ARFCN of the scanned cell.
<band>	32-bit unsigned integer. Frequency band in 5G SA network mode.
<NR_DL_bandwidth>	Integer type. DL bandwidth. It is only valid in RRC connected state. 0 5 MHz 1 10 MHz 2 15 MHz 3 20 MHz 4 25 MHz 5 30 MHz 6 40 MHz 7 50 MHz 8 60 MHz 9 70 MHz 10 80 MHz 11 90 MHz 12 100 MHz 13 200 MHz 14 400 MHz 15 35 MHz 16 45 MHz
<RSRP>	16-bit signed integer. - In LTE mode: It indicates the signal of LTE Reference Signal Received Power (see <i>3GPP 36.214</i>). Range: -140 to -44 dBm. A value closer to -44 indicates a stronger signal, whereas the value closer to -140 indicates a weaker signal. - In 5G mode: It indicates the signal of 5G Reference Signal Received Power. Range:

	-140 to -44 dBm. A value closer to -44 indicates a stronger signal, whereas the value closer to -140 indicates a weaker signal.
<RSRQ>	16-bit signed integer. <ul style="list-style-type: none">- In LTE mode: It indicates the signal of current LTE Reference Signal Received Quality (see 3GPP 36.214). Range: -20 to -3 dB. A value closer to -3 indicates a stronger signal, whereas the value closer to -20 indicates a weaker signal.- In 5G mode: It indicates the signal of current 5G Reference Signal Received Quality. Range: -20 to -3 dB. A value closer to -3 indicates a stronger signal, whereas the value closer to -20 indicates a weaker signal.
<SINR>	16-bit signed integer. <ul style="list-style-type: none">- In LTE mode: It indicates LTE Signal-to-Interface plus Noise Ratio. The conversion formula for actual SINR is $Y = (1/5) \times X \times 10 - 20$ (X is the <SINR> value queried by AT+QENG and Y is the actual value of LTE SINR after calculating with the formula). Range: -20 to 30 dB.- In 5G mode: It indicates the signal of 5G Signal-to-Interface plus Noise Ratio. Range: -23 to 40 dB.
<scs>	Integer type. NR subcarrier space. <ul style="list-style-type: none">0 15 kHz1 30 kHz2 60 kHz3 120 kHz4 240 kHz
<srxlev>	Integer type. Suitable reception level for inter frequency cell.
<is_tdd>	String type. LTE network mode. <ul style="list-style-type: none">"TDD""FDD"
<earfcn>	Integer type. E-UTRA-ARFCN of the scanned cell.
<freq_band_ind>	Integer type. E-UTRA frequency band (see 3GPP 36.101).
<UL_bandwidth>	Integer type. UL bandwidth. <ul style="list-style-type: none">0 1.4 MHz1 3 MHz2 5 MHz3 10 MHz4 15 MHz5 20 MHz
<DL_bandwidth>	Integer type. DL bandwidth. <ul style="list-style-type: none">0 1.4 MHz1 3 MHz2 5 MHz3 10 MHz

	4	15 MHz
	5	20 MHz
<RSSI>	Integer type. LTE Received Signal Strength Indication.	
<CQI>	Integer type. Channel Quality Indication. Range: 1-30.	
<tx_power>	Integer type. TX power value in 1/10 dBm. It is the maximum of all UL channel TX power. <tx_power> is only meaningful when the device is in traffic.	
<LAC>	Integer type. Location area code. Range: 0-65535. It determines the two-byte location area code in hexadecimal format (e.g. 00C1 equals 193 in decimal) of the scanned cell.	
<uarfcn>	Integer type. UTRA-ARFCN of scanned cell.	
<PSC>	Integer type. Primary scrambling code of scanned cell.	
<RAC>	Integer type. Routing Area Code. Range: 0-255.	
<RSCP>	Integer type. Received Signal Code Power level of scanned cell.	
<ecio>	Integer type. Carrier to noise ratio in dB = measured Ec/lo value in dB.	
<phych>	Integer type. Physical channel.	
	0	DPCH
	1	FDPCH
<SF>	Integer type. Spreading factor.	
	0	SF_4
	1	SF_8
	2	SF_16
	3	SF_32
	4	SF_64
	5	SF_128
	6	SF_256
	7	SF_512
	8	UNKNOWN
<slot>	Integer type.	
	0-16	Slot format for DPCH
	0-9	Slot format for FDPCH
<speech_code>	Integer type. Destination number on which call is to be deflected.	
<comMod>	Integer type. Number format. Compress mode.	
	0	Not support compress mode
	1	Support compress mode
<cell_resel_priority>	Integer type. Cell reselection priority. Range: 0-7.	
<s_non_intra_search>	Integer type. Threshold to control non-intra frequency search.	
<thresh_serving_low>	Integer type. It specifies the suitable reception level threshold (in dB) used by the UE on the serving cell when reselecting towards a lower priority RAT/frequency.	
<s_intra_search>	Integer type. Cell selection parameter for the intra frequency cell.	
<threshX_low>	Integer type. To be considered for re-selection. Suitable receive level value of an evaluated lower priority cell must be greater than this value.	
<threshX_high>	Integer type. To be considered for re-selection. Suitable receive level value of an evaluated higher priority cell must be greater than this value.	

<thresh_Xhigh>	Integer type. Reselection threshold for high priority layers.
<thresh_Xlow>	Integer type. Reselection threshold for low priority layers.
<srxqual>	Integer type. Receiver automatic gain control on the camped frequency.
<ecno>	Integer type. Ratio of the received energy per PN chip to the total received power spectral density (see 3GPP TS 25.133).
<set>	Integer type. 3G neighbor cell set. 1 Active set 2 Synchronous neighbor set 3 Asynchronous neighbor set
<rank>	Integer type. Rank of this cell as neighbor for inter-RAT cell reselection.
<srxlev>	Integer type. Selection of reception level value for base station in dB (see 3GPP 25.304).

NOTE

"-" or - indicates the parameter is invalid under current condition.

Example

```

AT+QENG="servingcell"
+QENG: "servingcell","NOCONN","LTE","FDD",460,01,5F1EA15,12,1650,3,5,5,DE10,-100,-12,-68,11,
--,27

OK
AT+QENG="servingcell"
+QENG: "servingcell","NOCONN"
+QENG: "LTE","FDD",460,01,5F1EA15,12,1650,3,5,5,DE10,-99,-12,-67,11,9,230,-
+QENG:"NR5G-NSA",460,01,747,-71,13,-11,627264,78,12,1

OK
AT+QENG="servingcell"
+QENG: "servingcell","NOCONN","NR5G-SA","TDD",460,01,9013B004,299,690E0F,633984,78,12,-1
07,-13,2,1,-

OK
AT+QENG="neighbourcell"
+QENG: "neighbourcell intra","LTE",38950,276,-3,-88,-65,0,37,7,16,6,44
+QENG: "neighbourcell inter","LTE",39148,-,-,-,-,37,0,30,7
+QENG: "neighbourcell inter","LTE",37900,-,-,-,-,0,0,30,6

OK

```

5.21. AT+QCAINFO Query Carrier Aggregation Parameters

This command queries carrier aggregation parameters.

AT+QCAINFO Query Carrier Aggregation Parameters	
Test Command AT+QCAINFO=?	Response +QCAINFO: (list of supported <5G_signal_ext>) OK
Read Command AT+QCAINFO?	Response +QCAINFO: <5G_signal_ext> OK
Write Command AT+QCAINFO=<5G_signal_ext>	Response OK Or ERROR
Execution Command AT+QCAINFO	In LTE mode: +QCAINFO: "PCC",<freq>,<bandwidth>,<band>,<pcell_state>,<PCID>,<RSRP>,<RSRQ>,<RSSI>,<RSSNR> [+QCAINFO: "SCC",<freq>,<bandwidth>,<band>,<sccell_state>,<PCID>,<RSRP>,<RSRQ>,<RSSI>,<RSSNR><UL_configured>,<UL_bandwidth>,<UL_EARFCN>] [...] OK In EN-DC mode: +QCAINFO: "PCC",<freq>,<bandwidth>,<band>,<pcell_state>,<PCID>,<RSRP>,<RSRQ>,<RSSI>,<RSSNR> [+QCAINFO: "SCC",<freq>,<bandwidth>,<band>,<sccell_state>,<PCID>,<RSRP>,<RSRQ>,<RSSI>,<RSSNR><UL_configured>,<UL_bandwidth>,<UL_EARFCN>] [...] [+QCAINFO: "SCC",<freq>,<NR_DL_bandwidth>,<NR_band>,<PCID>] [+QCAINFO: "SCC",<freq>,<NR_DL_bandwidth>,<NR_band>,<sccell_state>,<PCID>,<UL_configured>,<NR_UL_bandwidth>,<UL_ARFCN>[,<NR_RSRP>,<NR_RSRQ>,<NR_SN R>] [...] OK

	<p>In SA mode:</p> <p>+QCAINFO: "PCC",<freq>,<NR_DL_bandwidth>,<NR_band>,<PCID></p> <p>[+QCAINFO: "SCC",<freq>,<NR_DL_bandwidth>,<NR_band>,<state>,<PCID>,<UL_configured>,<NR_UL_bandwidth>,<UL_ARFCN>[,<NR_RSRP>,<NR_RSRQ>,<NR_SNR>]</p> <p>[...]</p> <p>OK</p> <p>If there is any error:</p> <p>ERROR</p>
Maximum Response Time	300 ms
Characteristics	<p>The command takes effect immediately.</p> <p>The configuration is saved automatically.</p>

Parameter

<freq>	Integer type. EARFCN.
<bandwidth>	Integer type. Bandwidth.
6	1.4 MHz
15	3 MHz
25	5 MHz
50	10 MHz
75	15 MHz
100	20 MHz
<band>	String type. LTE DL band information.
	"LTE BAND 1"
	"LTE BAND 2"
	"LTE BAND 3"
	...
	"LTE BAND 66"
<pcell_state>	Integer type. Primary cell state.
0	Not registered, not searching
1	Registered on home network
2	Not registered, searching
3	Registration denied
4	Unknow registration state
5	Registered on roaming network
<sccell_state>	Integer type. Secondary cell state.
0	Deconfigured
1	Configuration deactivated

	2 Configuration activated
<PCID>	Integer type. Physical Cell ID.
<RSRP>	Integer type. Reference Signal Received Power (see 3GPP 36.214)
<RSRQ>	Integer type. Reference Signal Received Quality (see 3GPP 36.214)
<RSSI>	Integer type. Received Signal Strength Indication.
<RSSNR>	Integer type. Logarithmic value of RSSNR. Range: -10 to +30 dB.
<UL_configured>	Integer type. Whether the UL of secondary cell is configured by network. 0 Not configured 1 Configured
<UL_bandwidth>	Integer type. UL bandwidth. "-" will be displayed if <UL_configured> =0. 6 1.4 MHz 15 3 MHz 25 5 MHz 50 10 MHz 75 15 MHz 100 20 MHz
<UL_EARFCN>	Integer type. UL EARFCN. "-" will be displayed if <UL_configured> =0.
<NR_DL_bandwidth>	Integer type. NR downlink bandwidth. 0 5 MHz 1 110 MHz 2 15 MHz 3 20 MHz 4 25 MHz 5 30 MHz 6 40 MHz 7 50 MHz 8 60 MHz 9 70 MHz 10 80 MHz 11 90 MHz 12 100 MHz 13 200 MHz 14 400 MHz 15 35 MHz 16 45 MHz
<NR_band>	String Type. NR DL band information. "NR5G BAND 1" "NR5G BAND 2" "NR5G BAND 3" ... "NR5G BAND 261"
<NR_UL_bandwidth>	Integer type. "-" will be displayed if <UL_configured> =0. The value of <NR_UL_bandwidth> is the same as that of <NR_DL_bandwidth> .
<UL_ARFCN>	Integer type. UL_ARFCN. "-" will be displayed if <UL_configured> is 0.

<NR_RSRP>	Integer type. NR Reference Signal Received Power. Range: -140 to -44; Unit: dBm. The closer to -44, the better the signal is. The closer to -140, the worse the signal is.
<NR_RSRQ>	Integer type. Current NR Reference Signal Received Quality. Range: -20 to -3; Unit: dB. The closer to -3, the better the signal is. The closer to -20, the worse the signal is.
<NR_SNR>	Integer type. Current NR SNR. Range: -2300 to 4000. The actual value of NR SNR is calculated via the formula: $\text{NR SNR} = \frac{\text{NR_RSRP}}{100}$ Range of NR SNR: -23 to 40; Unit: dB.
<5G_signal_ext>	Integer type. Hide or show extension parameters: <NR_RSRP> , <NR_RSRQ> and <NR_SNR> 0 Hide 1 Show

NOTE

This command is valid only after the module registers on network.

Example

```
AT+QCAINFO
+QCAINFO: "PCC",300,100,"LTE BAND 1",1,23,-66,-12,-34,30
+QCAINFO: "SCC",1575,100,"LTE BAND 3",2,43,-64,-7,-24,30,0,-,
OK
```

5.22. AT+QNETRC Get the Cause of Network Rejection

This command gets the cause of network rejection. This Write Command sets whether to present URC and controls the presentation of the URC **+QNETRC: "emm_cause",<emm_reject_cause>** when **<mode>** & 0x01 = 1 and the module receives a rejection code issued by the network during LTE network registration, the URC **+QNETRC: "esm_cause",<esm_reject_cause>** when **<mode>** & 0x02 = 2 and the module receives a rejection code issued by the network during LTE session management process, or the URC **+QNETRC: "5gmm_cause",<5gmm_reject_cause>** when **<mode>** & 0x4 = 4 and the module receives a rejection code issued by the network during 5G network registration.

AT+QNETRC Get the Cause of Network Rejection

Read Command

AT+QNETRC?

Response

+QNETRC: "emm_cause",<emm_reject_cause>
+QNETRC: "esm_cause",<esm_reject_cause>

	+QNETRC: "5gmm_cause",<5gmm_reject_cause>
	OK
Write Command AT+QNETRC=<mode>	Response OK Or ERROR
Execution Command AT+QNETRC	Response +QNETRC: <mode> OK
Characteristics	-

Parameter

<mode>	Integer type. Determines the output type of URC sentences by bitwise OR. 0 No URC report 1 EMM URC 2 ESM URC 4 5GMM URC
<emm_reject_cause>	Integer type. EMM reject cause. 0 No cause 2 IMSI unknown in HSS 3 Illegal UE 5 IMEI not accepted 6 Illegal ME 7 EPS services not allowed 8 EPS services and non-EPS services not allowed 9 UE identity cannot be derived by the network 10 Implicitly detached 11 PLMN not allowed 12 Tracking Area not allowed 13 Roaming not allowed in this tracking area 14 EPS services not allowed in this PLMN 15 No Suitable Cells in tracking area 16 MSC temporarily not reachable 17 Network failure 18 CS domain not available 19 ESM failure 20 MAC failure 21 Synch failure 22 Congestion 23 UE security capabilities mismatch

24	Security mode rejected, unspecified
25	Not authorized for this CSG
26	Non-EPS authentication unacceptable
31	Redirection to 5GCN required
35	Requested service option not authorized in this PLMN
39	CS service temporarily not available
40	No EPS bearer context activated
42	Severe network failure
95	Semantically incorrect message
96	Invalid mandatory information
97	Message type non-existent or not implemented
98	Message type not compatible with the protocol state
99	Information element non-existent or not implemented
100	Conditional IE error
101	Message not compatible with the protocol state
111	Protocol error, unspecified
<esm_reject_cause>	Integer type. ESM reject cause.
0	No cause
8	Operator Determined Barring
26	Insufficient resources
27	Missing or unknown APN
28	Unknown PDN type
29	User authentication failed
30	Request rejected by Serving GW or PDN GW
31	Request rejected, unspecified
32	Service option not supported
33	Requested service option not subscribed
34	Service option temporarily out of order
35	PTI already in use
36	Regular deactivation
37	EPS QoS not accepted
38	Network failure
39	Reactivation requested
41	Semantic error in the TFT operation
42	Syntactical error in the TFT operation
43	Invalid EPS bearer identity
44	Semantic errors in packet filter(s)
45	Syntactical errors in packet filter(s)
46	Unused (see NOTE 2)
47	PTI mismatch
49	Last PDN disconnection not allowed
50	PDN type IPv4 only allowed
51	PDN type IPv6 only allowed
52	Single address bearers only allowed

53	ESM information not received
54	PDN connection does not exist
55	Multiple PDN connections for a given APN not allowed
56	Collision with network initiated request
57	PDN type IPv4v6 only allowed
58	PDN type non IP only allowed
59	Unsupported QCI value
60	Bearer handling not supported
61	PDN type Ethernet only allowed
65	Maximum number of EPS bearers reached
66	Requested APN not supported in current RAT and PLMN combination
81	Invalid PTI value
95	Semantically incorrect message
96	Invalid mandatory information
97	Message type non-existent or not implemented
98	Message type not compatible with the protocol state
99	Information element non-existent or not implemented
100	Conditional IE error
101	Message not compatible with the protocol state
111	Protocol error, unspecified
112	APN restriction value incompatible with active EPS bearer context
113	Multiple accesses to a PDN connection not allowed
<5gmm_reject_cause>	Integer type. 5GMM reject cause.
0	No cause
3	Illegal UE
5	PEI not accepted
6	Illegal ME
7	5GS services not allowed
9	UE identity cannot be derived by the network
10	Implicitly de-registered
11	PLMN not allowed
12	Tracking area not allowed
13	Roaming not allowed in this tracking area
15	No suitable cells in tracking area
20	MAC failure
21	Synch failure
22	Congestion
23	UE security capabilities mismatch
24	Security mode rejected, unspecified
26	Non-5G authentication unacceptable
27	N1 mode not allowed
28	Restricted service area
31	Redirection to EPC required

43	LADN not available
62	No network slices available
65	Maximum number of PDU sessions reached
67	Insufficient resources for specific slice and DNN
69	Insufficient resources for specific slice
71	ngKSI already in use
72	Non-3GPP access to 5GCN not allowed
73	Serving network not authorized
74	Temporarily not authorized for this SNPN
75	Permanently not authorized for this SNPN
76	Not authorized for this CAG or authorized for CAG cells only
77	Wireline access area not allowed
78	PLMN not allowed to operate at the present UE location
79	UAS services not allowed
90	Payload was not forwarded
91	DNN not supported or not subscribed in the slice
92	Insufficient user-plane resources for the PDU session
95	Semantically incorrect message
96	Invalid mandatory information
97	Message type non-existent or not implemented
98	Message type not compatible with the protocol state
99	Information element non-existent or not implemented
100	Conditional IE error
101	Message not compatible with the protocol state
111	Protocol error, unspecified

Example

```
AT+QNETRC=7
OK
AT+QNETRC
+QNETRC: 7

OK
AT+QNETRC?
+QNETRC: "emm_cause",7
+QNETRC: "esm_cause",0
+QNETRC: "5gmm_cause",0

OK
```

5.23. AT+QNWCFG Configure and Query Network Parameters

This command configures and queries network parameters.

AT+QNWCFG Configure and Query Network Parameters

Test Command AT+QNWCFG=?	Response +QNWCFG: "lte_cell_id", +QNWCFG: "nr5g_cell_id" +QNWCFG: "wcdma_cqi" +QNWCFG: "up/down", (range of supported <time_interval>s) +QNWCFG: "dss_enable", (list of supported <enable>s)
	OK
Maximum Response Time	300 ms
Characteristics	-

5.23.1. AT+QNWCFG="lte_cell_id" Read Cell ID Under LTE

This command reads ECGI, ECI, eNodeB ID under LTE.

AT+QNWCFG="lte_cell_id" Read Cell ID Under LTE

Write Command AT+QNWCFG="lte_cell_id"	Response [+QNWCFG: "lte_cell_id", <ECGI>, <ECI>, <eNodeB_ID>]
	OK
Maximum Response Time	300 ms
Characteristics	-

Parameter

<ECGI>	Integer type. E-UTRAN Cell Global Identifier in hexadecimal format (MCC + MNC + ECI).
<ECI>	Integer type. E-UTRAN Cell Identity in hexadecimal format (eNodeB ID + cell ID).
<eNodeB_ID>	Integer type. LTE base station ID in hexadecimal format.

Example

AT+QNWCFG="lte_cell_id" //Read cell IDs under LTE.

```
+QNWCFG: "lte_cell_id",64F0000D6B5C0,0D6B5C0,0D6B5
```

OK

AT+QNWCFG="lte_cell_id"

//Read cell ID under non-LTE mode.

OK

5.23.2. AT+QNWCFG="nr5g_cell_id" Read Cell ID Under 5G SA

This command reads the NCGI, NCI, NR5G base station ID under 5G SA.

AT+QNWCFG="nr5g_cell_id" Read Cell ID Under 5G SA

Write Command	Response
AT+QNWCFG="nr5g_cell_id"	[+QNWCFG: "nr5g_cell_id",<NCGI>,<NCI>,<gNodeB_ID>]
	OK
Maximum Response Time	300 ms
Characteristics	-

Parameter

<NCGI>	Integer type. NR Cell Global Identification in hexadecimal format (MCC + MNC + NCI).
<NCI>	Integer type. NR Cell Identification in hexadecimal format (gNodeB ID + cell ID).
<gNodeB_ID>	Integer type. 5G base station ID in hexadecimal format.

Example

```
AT+QNWCFG="nr5g_cell_id" //Read cell IDs under 5G SA.
```

```
+QNWCFG: "nr5g_cell_id",64F000170C23000,170C23000,170C23
```

OK

AT+QNWCFG="nr5g_cell_id"

//Read cell ID under non-5G SA.

OK

5.23.3. AT+QNWCFG="wcdma_cqi" Read CQI Under WCDMA

This command reads CQI (Channel Quality Indicator) under WCDMA.

AT+QNWCFG="wcdma_cqi" Read CQI Under WCDMA

Write Command	Response

AT+QNWCFG="wcdma_cqi"	+QNWCFG: "wcdma_cqi",<CQI_value>
	OK
Maximum Response Time	300 ms
Characteristics	-

Parameter

<CQI_value> Integer type. CQI value. Range: 0–30 and 255. If 255 is returned, it means that CQI in WCDMA is invalid.

NOTE

The CQI value can be obtained after the HSDPA channel is created, and the HSDPA channel can be established by testing the data traffic.

Example

```
AT+QNWCFG="wcdma_cqi"
+QNWCFG: "wcdma_cqi",27
OK
```

5.23.4. AT+QNWCFG="up/down" Get Average Uplink and Downlink Rates in Delta Time

Time

This command gets average uplink rate and downlink rate in delta time.

AT+QNWCFG="up/down" Get Average Uplink Rate and Downlink Rate in Delta Time

Write Command

AT+QNWCFG="up/down"[, <time_interval>]

Response

If the optional parameter is omitted, query the current setting:
+QNWCFG: "up/down",<uplink>,<downlink>,<time_interval>

OK

If the optional parameter is specified, set interval time for automatically calculating the average rate:

OK

If there is any error:

	ERROR
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is not saved.

Parameter

<uplink>	Integer type. Average uplink rate in delta time. Unit: bits/second.
<downlink>	Integer type. Average downlink rate in delta time. Unit: bits/second.
<time_interval>	Integer type. Time required to calculate the average rate automatically. Range:1–60. Default value: 2. Unit: second.

NOTE

Executing **AT+QNWCFG="up/down"** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWCFG="up/down"      //Query the current setting.
+QNWCFG: "up/down",2056,384,2

OK
AT+QNWCFG="up/down",5    //Set the interval time for automatically calculating the average rate.
OK
```

5.23.5. AT+QNWCFG="dss_enable" Enable or Disable DSS Function

This command enables or disables DSS Function.

AT+QNWCFG="dss_enable" Enable/Disable DSS Function

Write Command

AT+QNWCFG="dss_enable"[,<enable>]

Response

If the optional parameter is omitted, query the current setting:

+QNWCFG: "dss_enable",<enable>

OK

If the optional parameter is specified, enable or disable DSS:

OK

If there is any error:

ERROR

Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configuration is saved automatically.

Parameter

<enable>	Integer type. Enable or disable DSS function. 0 Disable 1 Enable
-----------------------	--

Example

```
AT+QNWCFG="dss_enable",1          //Enable DSS function.
OK
AT+QNWCFG="dss_enable"          //Query whether DSS is enabled.
+QNWCFG: "dss_enable",1
OK
```

5.24. AT+QNWPREFCFG Configure Network Searching Preferences

This command configures the network searching preferences.

AT+QNWPREFCFG Configure Network Searching Preferences

Test Command AT+QNWPREFCFG=?	Response +QNWPREFCFG: "gw_band", (list of supported <gw_band>s) +QNWPREFCFG: "lte_band", (list of supported <LTE_band>s) +QNWPREFCFG: "nsa_nr5g_band", (list of supported <NSA_N R5G_band>s) +QNWPREFCFG: "nr5g_band", (list of supported <SA_NR5G_b and>s) +QNWPREFCFG: "mode_pref", (list of supported <mode_pref> s) +QNWPREFCFG: "srv_domain", (range of supported <srv_dom ain>s) +QNWPREFCFG: "voice_domain", (range of supported <voice_ domain>s) +QNWPREFCFG: "roam_pref", (list of supported <roam_pref>s) +QNWPREFCFG: "ue_usage_setting", (list of supported <settin g>s)
---------------------------------	--

	+QNWPREFCFG: "policy_band" +QNWPREFCFG: "ue_capability_band" +QNWPREFCFG: "rat_acq_order", (list of supported <rat_order>s) +QNWPREFCFG: "nr5g_disable_mode", (list of supported <disable_mode>s)
	OK
Maximum Response Time	300 ms
Characteristics	-

5.24.1. AT+QNWPREFCFG="gw_band" Set WCDMA Band

This command specifies the preferred WCDMA band to be searched by UE.

AT+QNWPREFCFG="gw_band" Set WCDMA Band

Write Command	Response
AT+QNWPREFCFG="gw_band" [,<gw_band>]	If the optional parameter is omitted, query the current setting: +QNWPREFCFG: "gw_band",<gw_band>
	OK
	If the optional parameter is specified, set the preferred WCDMA bands to be searched: OK
	If there is any error: ERROR
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<gw_band>	String type. WCDMA bands to be configured. Format: <WCDMA_band1>:<WCDMA_band2>:...:<WCDMA_bandn>
<WCDMA_band>	Integer type. WCDMA band. 1 WCDMA 2100 band 2 WCDMA 1900 band 3 WCDMA 1800 band 4 WCDMA 1700 band

-
- 5 WCDMA 850 band
 6 WCDMA 800 band
 8 WCDMA 900 band
 19 WCDMA Japan 850 band
-

NOTE

1. See the specific module specification for the bands that can be supported.
2. When the module locks to WCDMA, an error is reported if **<gw_band>** is set to null.
3. Executing **AT+QNWPREFCFG="gw_band",<gw_band>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG="gw_band"      //Query the configured WCDMA bands of the UE.
```

```
+QNWPREFCFG: "gw_band",1:2:3:4:5:6:7:8:9:19
```

OK

```
AT+QNWPREFCFG="gw_band",1:2      //Set WCDMA B1 and B2.
```

OK

5.24.2. AT+QNWPREFCFG="Ite_band" Set LTE Band

This command specifies the preferred LTE band to be searched by UE.

AT+QNWPREFCFG="Ite_band" Set LTE Band

Write Command

**AT+QNWPREFCFG="Ite_band"
[,<LTE_band>]**

Response

If the optional parameter is omitted, query the current setting:
+QNWPREFCFG: "Ite_band",<LTE_band>

OK

If the optional parameter is specified, set the preferred LTE bands to be searched:

OK

If there is any error:

ERROR

Maximum Response Time

300 ms

Characteristics

The command takes effect immediately.
 The configuration is saved automatically.

Parameter

<LTE_band> String type. LTE bands to be configured. Format: **<band1>:<band2>:...:<bandn>**.

<band> Integer type. LTE bands supported by the module.

1–5	B1–B5
7	B7
8	B8
12–14	B12–B14
17–20	B17–B20
25	B25
26	B26
28–30	B28–B30
32	B32
34	B34
38–43	B38–B43
48	B48
66	B66
71	B71

NOTE

1. See the specific module specification for the bands that are supported.
2. When the module locks to LTE, an error is reported if **<LTE_band>** is set to null.
3. Executing **AT+QNWPREFCFG="lte_band",<LTE_band>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG="lte_band"          //Query the configured LTE bands of the UE.  
+QNWPREFCFG: "lte_band",1:2:3:4:5:7:8:12:13:14:17:18:19:20:25:26:28:29:30:32:34:38:39:40:41:  
42:66:71
```

OK

```
AT+QNWPREFCFG="lte_band",1:2      //Set LTE B1 and LTE B2.  
OK
```

5.24.3. AT+QNWPREFCFG="nsa_nr5g_band" Set 5G NSA Band

This command specifies the preferred 5G NSA bands to be searched by UE.

AT+QNWPREFCFG="nsa_nr5g_band" Set 5G NSA Band

Write Command

Response

AT+QNWPREFCFG="nsa_nr5g

If the optional parameter is omitted, query the current setting:

_band"[,<NSA_NR5G_band>]	+QNWPREFCFG: "nsa_nr5g_band",<NSA_NR5G_band> OK If the optional parameter is specified, set the preferred 5G NSA bands to be searched: OK If there is any error: ERROR
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<NSA_NR5G_band>	String type. 5G NSA bands to be configured. Format: <NSA_band1>:<NSA_band2>:...:<NSA_bandn>
<SA_band>	Integer type. 5G NSA band. The configurable 5G NSA bands supported by the module. 1–3 n1–n3 5 n5 7 n7 8 n8 12 n12 20 n20 25 n25 28 n28 38 n38 40 n40 41 n41 48 n48 66 n66 71 n71 77–79 n77–n79 257 n257 258 n258 260 n260 261 n261

NOTE

1. See the specific module specification for the bands that are supported.
2. When the module locks to 5G NSA, an error is reported if <NSA_NR5G_band> is set to null.
3. Executing **AT+QNWPREFCFG="nsa_nr5g_band",<NSA_NR5G_band>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG= "nsa_nr5g_band" //Query the currently configured 5G NSA bands of UE.
```

```
+QNWPREFCFG: "nsa_nr5g_band",1:3:7:20:28:40:41:71:77:78:79
```

```
OK
```

```
AT+QNWPREFCFG= "nsa_nr5g_band",1:2 //Set 5G NSA n1 and 5G NSA n2.
```

```
OK
```

5.24.4. AT+QNWPREFCFG="nr5g_band" Set 5G SA Band

This command specifies the preferred 5G SA band to be searched by UE.

AT+QNWPREFCFG="nr5g_band" Set 5G SA Band

Write Command

AT+QNWPREFCFG="nr5g_band",<SA_NR5G_band>

Response

If the optional parameter is omitted, query the current setting:

+QNWPREFCFG: "nr5g_band",<SA_NR5G_band>

OK

If the optional parameter is specified, set the preferred NR5G SA bands to be searched:

OK

If there is any error:

ERROR

Maximum Response Time

300 ms

Characteristics

The command takes effect immediately.

The configuration is saved automatically.

Parameter

<SA_NR5G_band> String type. 5G NSA bands to be configured. Format:
<SA_band1>:<SA_band2>:...:<SA_bandn>.

<SA_band> Integer type. SA 5G band. The configurable SA 5G bands supported by the

applicable modules.

1–3	n1–n3
7	n7
8	n8
12	n12
20	n20
25	n25
28	n28
38	n38
40	n40
41	n41
48	n48
66	n66
71	n71
77–79	n77–n79

NOTE

1. See the specific module specification for the bands that are supported by the module.
2. When the module locks to 5G SA, an error is reported if <SA_NR5G_band> is set to null.
3. Executing **AT+QNWPREFCFG="nr5g_band",<SA_NR5G_band>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG= "nr5g_band"          //Query the currently configured 5G SA bands of the UE.  
+QNWPREFCFG: "nr5g_band",1:3:7:20:28:40:41:71:77:78:79
```

OK

```
AT+QNWPREFCFG= "nr5g_band",1:2      //Set 5G SA n1 and 5G SA n2.  
OK
```

5.24.5. AT+QNWPREFCFG="mode_pref" Set Network Search Mode

This command specifies the network search mode.

AT+QNWPREFCFG="mode_pref" Set Network Search Mode

Write Command

AT+QNWPREFCFG="mode_pref"
f"["<mode_pref>"]

Response

If the optional parameter is omitted, query the current setting:
+QNWPREFCFG: "mode_pref",<mode_pref>

OK

	If the optional parameter is specified, set the network search mode: OK If there is any error: ERROR
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<mode_pref> String type without double quotes. RATs to be configured.
 Format: **<mode_pref1>:<mode_pref2>:...:<mode_pref2n>**. RATs supported:
 AUTO WCDMA & LTE & 5G
 WCDMA WCDMA only
 LTE LTE only
 NR5G 5G only

NOTE

Executing **AT+QNWPREFCFG="mode_pref",<mode_pref>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG="mode_pref"          //Query the current setting.  

+QNWPREFCFG: "mode_pref",AUTO  

  

OK  

AT+QNWPREFCFG="mode_pref",LTE      //Set RAT to LTE only.  

OK  

AT+QNWPREFCFG="mode_pref",LTE:NR5G //Set RAT to LTE & 5G.  

OK
```

5.24.6. AT+QNWPREFCFG="srv_domain" Set Service Domain

This command specifies the registered service domain.

AT+QNWPREFCFG="srv_domain" Set Service Domain

Write Command	Response
AT+QNWPREFCFG="srv_domain" in"[,<srv_domain>]"	If the optional parameter is omitted, query the current setting: +QNWPREFCFG: "srv_domain",<srv_domain>

	OK If the optional parameter is specified, set the service domain of UE: OK If there is any error: ERROR
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<srv_domain> Integer type. UE service domain.

- 0 CS only
- 1 PS only
- 2 CS & PS

NOTE

Executing **AT+QNWPREFCFG="srv_domain",<srv_domain>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG="srv_domain"          //Query the current setting.
+QNWPREFCFG: "srv_domain",2

OK
AT+QNWPREFCFG="srv_domain",1      //Set PS only.
OK
```

5.24.7. AT+QNWPREFCFG="voice_domain" Set Voice Domain

This command specifies the UE voice domain.

AT+QNWPREFCFG="voice_domain" Set Voice Domain

Write Command

AT+QNWPREFCFG="voice_domain",<voice_domain>

Response

If the optional parameter is omitted, query the current setting:
+QNWPREFCFG: "voice_domain",<voice_domain>

	OK If the optional parameter is specified, set UE voice domain: OK If there is any error: ERROR
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<voice_domain>	Integer type. UE voice domain. 0 CS voice only 1 IMS PS voice only 2 CS voice preferred with IMS PS voice as secondary 3 IMS PS voice preferred with CS voice as secondary
-----------------------------	--

NOTE

Executing **AT+QNWPREFCFG="voice_domain",<voice_domain>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG="voice_domain"          //Query the current configuration.
+QNWPREFCFG: "voice_domain",2

OK
AT+QNWPREFCFG="voice_domain",3        //Set IMS voice preferred.
OK
```

5.24.8. AT+QNWPREFCFG="roam_pref" Set Roaming Preference

This command specifies the roaming preference of UE.

AT+QNWPREFCFG="roam_pref" Set Roaming Preference

Write Command

AT+QNWPREFCFG="roam_pref"
ef"[,<roam_pref>]

Response

If the optional parameter is omitted, query the current setting:
+QNWPREFCFG: "roam_pref",<roam_pref>

	OK If the optional parameter is specified, set UE roaming preference: OK If there is any error: ERROR
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<roam_pref>	Integer type. UE roaming preference.
1	Roam only on home network
3	Roam on affiliate network
<u>255</u>	Roam on any network

NOTE

Executing **AT+QNWPREFCFG="roam_pref",<roam_pref>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG="roam_pref"          //Query the current setting.
+QNWPREFCFG: "roam_pref",255

OK
AT+QNWPREFCFG= "roam_pref",1      //Roam only on home network.
OK
```

5.24.9. AT+QNWPREFCFG="ue_usage_setting" Set UE Usage Setting

This command specifies the usage setting of UE.

AT+QNWPREFCFG="ue_usage_setting" Set UE Usage Setting

Write Command	Response
AT+QNWPREFCFG="ue_usage_setting"[],<setting>	If the optional parameter is omitted, query the current setting: +QNWPREFCFG: "ue_usage_setting",<setting>
	OK

	If the optional parameter is specified, set UE usage setting: OK
	If there is any error: ERROR
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<setting> Integer type. Usage setting of UE .
0 Voice centric
1 Data centric

NOTE

Executing **AT+QNWPREFCFG="ue_usage_setting",<setting>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG="ue_usage_setting"      //Query the current setting.
+QNWPREFCFG: "ue_usage_setting",1

OK
AT+QNWPREFCFG="ue_usage_setting",0      //Set voice centric.
OK
```

5.24.10. AT+QNWPREFCFG="policy_band" Read Carrier Policy Band

This command reads the band configured in the carrier policy.

AT+QNWPREFCFG="policy_band" Read Carrier Policy Band

Write Command	Response
AT+QNWPREFCFG="policy_band"	+QNWPREFCFG: "gw_band",<gw_band>
	+QNWPREFCFG: "lte_band",<LTE_band>
	+QNWPREFCFG: "nsa_nr5g_band",<NSA_NR5G_band>
	+QNWPREFCFG: "nr5g_band",<NR5G_band>

OK	
Maximum Response Time	300 ms
Characteristics	-

Parameter

<gw_band>	String type. WCDMA bands to be configured. Format: <WCDMA_band1>:<WCDMA_band2>:...:<WCDMA_bandn>
<WCDMA_band>	Integer type. WCDMA band. See <WCDMA_band> in <i>Chapter 5.24.1</i> .
<LTE_band>	String type. LTE bands to be configured. Format: <band1>:<band2>:...:<bandn> .
<band>	Integer type. LTE band. See <band> in <i>Chapter 5.24.2</i> .
<NSA_NR5G_band>	String type. 5G NSA bands to be configured. Format: <NSA_band1>:<NSA_band2>:...:<NSA_bandn>
<NSA_band>	Integer type. 5G NSA band. See <NSA_band> in <i>Chapter 5.24.3</i> .
<SA_NR5G_band>	String type. 5G SA bands to be configured. Format: <SA_band1>:<SA_band2>:...:<SA_bandn>
<SA_band>	Integer type. 5G SA band. See <SA_band> in <i>Chapter 5.24.4</i> .

NOTE

See the specific module specification for the bands supported.

Example

```
AT+QNWPREFCFG="policy_band"
+QNWPREFCFG: "gw_band",1:8
+QNWPREFCFG: "lte_band",1:3:8
+QNWPREFCFG: "nsa_nr5g_band",78
+QNWPREFCFG: "nr5g_band",78
```

OK

5.24.11. AT+QNWPREFCFG="ue_capability_band" Query UE Band Capability

This command queries the band configured in the UE capability.

AT+QNWPREFCFG="ue_capability_band" Query UE Band Capability

Write Command

AT+QNWPREFCFG="ue_capability_

Response

+QNWPREFCFG: "gw_band",<gw_band>

band"	+QNWPREFCFG: "lte_band",<LTE_band> +QNWPREFCFG: "nsa_nr5g_band",<NSA_NR5G_band> +QNWPREFCFG: "nr5g_band",<NR5G_band>
Maximum Response Time	300 ms
Characteristics	-

Parameter

<gw_band>	String type. Use the colon as a separator to list the WCDMA bands to be configured. Parameter format:: <WCDMA_band1>:<WCDMA_band2>:...:<WCDMA_bandn>
<WCDMA_band>	Integer type. WCDMA band. See <WCDMA_band> in <i>Chapter 5.24.1</i> .
<LTE_band>	String type. Use the colon as a separator to list the LTE bands to be configured. Parameter format: <band1>:<band2>:...:<bandn>.
<band>	Integer type. LTE band. See <band> in <i>Chapter 5.24.2</i> .
<NSA_NR5G_band>	String type. Use the colon as a separator to list the NR5G NSA bands to be configured. Parameter format: <NSA_band1>:<NSA_band1>:...:<NSA_bandn>
<NSA_band>	Integer type. 5G NSA band. See <NSA_band> in <i>Chapter 5.24.3</i> .
<SA_NR5G_band>	String type. Use the colon as a separator to list the NR5G SA bands to be configured. Parameter format: <SA_band1>:<SA_band2>:...:<SA_bandn>
<SA_band>	Integer type. 5G SA band. See <SA_band> in <i>Chapter 5.24.4</i> .

NOTE

Please see the module specification for the bands supported by the specific module.

Example

```
AT+QNWPREFCFG="ue_capability_band"
+QNWPREFCFG: "gw_band",1:8
+QNWPREFCFG: "lte_band",1:3:8
+QNWPREFCFG: "nsa_nr5g_band",78
+QNWPREFCFG: "nr5g_band",78
```

OK

5.24.12. AT+QNWPREFCFG="rat_acq_order" Set RAT Priority

This command sets the RAT acquisition order.

AT+QNWPREFCFG="rat_acq_order" Set RAT Priority

Write Command	Response
AT+QNWPREFCFG="rat_acq_order"[,<rat_order>]	If the optional parameter is omitted, query the current setting: +QNWPREFCFG: "rat_acq_order",<rat_order>
	OK
	If the optional parameter is specified, set the RAT acquisition order: OK
	If there is any error: ERROR
Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configuration is saved automatically.

Parameter

<rat_order>	String type without double quotes. RAT priority. Format: <rat_order1>:<rat_order2>:...:<rat_ordern> . RATs supported: WCDMA LTE NR5G
--------------------------	---

NOTE

Executing **AT+QNWPREFCFG="rat_acq_order",<rat_order>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG= "rat_acq_order"                                //Query the current RAT order.
+QNWPREFCFG: "rat_acq_order",NR5G:LTE:WCDMA

OK
AT+QNWPREFCFG= "rat_acq_order",LTE:NR5G:WCDMA      //Set RAT order priority.
OK
AT+CFUN=1,1                                         //Reset the module.
OK
```

```
AT+QNWPREFCFG= "rat_acq_order" //Query the current RAT order.
+QNWPREFCFG: "rat_acq_order", LTE:NR5G:WCDMA
```

OK

5.24.13. AT+QNWPREFCFG="nr5g_disable_mode" Disable 5G

This command disables 5G.

AT+QNWPREFCFG="nr5g_disable_mode" Disable 5G

Write Command	Response
AT+QNWPREFCFG="nr5g_disable_mode"[,<disable_mode>]	If the optional parameter is omitted, query the current setting: +QNWPREFCFG: "nr5g_disable_mode",<disable_mode>
	OK
	If the optional parameter is specified, disable NR5G: OK
	If there is any error: ERROR
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<disable_mode> Integer type. Disable 5G SA/NSA.

- 0 Neither is disabled
- 1 Disable 5G SA
- 2 Disable 5G NSA

NOTE

Executing **AT+QNWPREFCFG="nr5g_disable_mode",<disable_mode>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG="nr5g_disable_mode" //Query the current configuration.
+QNWPREFCFG: "nr5g_disable_mode",0
```

OK

AT+QNWPREFCFG="nr5g_disable_mode",1 //Disable 5G SA.

OK