

Exhibit 4 - U.S. Patent No. 9,198,042 (“’042 Patent”)

Accused Instrumentalities: smartphones, basic phones, tablets, laptops, and hotspot devices sold (including those sold in bundles with data plans) or used by AT&T for use with AT&T’s wireless network services, and all versions and variations thereof since the issuance of the asserted patent.

Claim 1

Issued Claim(s)	Public Documentation
1. A method comprising:	To the extent the preamble is limiting, AT&T’s Accused Instrumentalities practice the steps of a method as set forth in the limitations below.
1[a] receiving, over a service control link, a report from a wireless end-user device, the report comprising information about a device service state;	The Accused Instrumentalities comprise receiving, over a service control link, a report from a wireless end-user device, the report comprising information about a device service state. AT&T offers telecommunications service plans to customers that are provided through various network elements such as telecommunications base stations and cell sites, edge servers, and other telecommunications servers. AT&T provides various network service plans to customers for purchase, including through the ATT.com website as well as through AT&T-provided services such as its pre-paid mobile service category, Prepaid by AT&T. <i>See, e.g.:</i>

Compare our AT&T Prepaid® plans

All plans include AT&T 5G and AT&T ActiveArmor™ mobile security.

Most popular

More great plans

Double data

AT&T Prepaid

16GB 3-month

\$33.00/mo. plus taxes and fees.

when you prepay \$99 for 3 months

After high-speed data is used, speed slowed to a max of 128 Kbps for rest of term. Taxes & fees extra.

Shop now

Here's what you'll get: ^

Unlimited talk, text, & 16B high-speed data

5G 5G access included¹

Unlimited text from the U.S. to over [230 countries](#)

Unlimited talk, text & use of plan data in and between the U.S., Mexico & Canada (5G in U.S. only)

Save all year

AT&T Prepaid

12-month Unlimited

\$25.00/mo. plus taxes and fees.

when you prepay \$300 for 12 months

After 16GB, speeds slowed to max 1.5Mbps for the month.

Req's new single line and \$300 prepayment. Taxes extra. Terms & restr's apply. [See details](#)

Shop now

Here's what you'll get: ^

Unlimited talk, text, & data

5G 5G access included¹

Unlimited text from the U.S. to over [230 countries](#)

Calls to Canada and Mexico from the U.S.

AT&T ActiveArmor mobile security²

5GB hotspot included

AT&T Prepaid

Unlimited

~~\$65.00~~
\$50.00/mo. with AutoPay*

\$65/mo. without AutoPay

AT&T may temporarily slow data speeds if the network is busy. Taxes & fees extra. [See details](#)

Shop now

Here's what you'll get: ^

Unlimited talk, text, & high-speed data

5G 5G access included¹

Unlimited text from the U.S. to over [230 countries](#)

Unlimited talk, text & data in and between Mexico & Canada
Limit 25GB in Canada, 5G in U.S. only.

<https://www.att.com/prepaid/plans/>

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1. Pick your device

2. Customize your device

3. Choose your plan

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AT&T PREPAID

Tablets & Laptops

Smartwatches

Hotspots & more

Accessories

Filters

Clear all

Samsung

15 items

Hide filters

Sort-by: Best-selling

Show prices with trade-in

ON

Buy online & pick up at store

Find stores

Delivery method

Brand

Apple

Google

Motorola

☒ Samsung

Sonim

Galaxy Z Fold5 | Z Flip5

Samsung Galaxy Z Series

Save up to \$1,000

Trade in a Galaxy phone. Any year.

Any condition.

Ltd time. Requires trade-in of Galaxy Note, S, or Z series. Req's elig. installment plan and elig. unlimited plan (AT&T may temporarily slow data speeds if the network is busy). Up to \$1,000 off after 36 mo. credits. Other terms apply. See offer details.

Any year. Any condition.

Samsung Galaxy Z Flip5

As low as \$0.00/mo. \$278/mo. with eligible trade-in

Req's elig. unlimited & trade-in. Price after 36 mo. credits. Speed restr's & other terms apply. Req's 0% APR 36-mo. agmt and svc. Well-qual. customers. See offer details.

Compare

Any year. Any condition.

Samsung Galaxy Z Fold5

As low as \$22.23/mo. \$500/mo. with eligible trade-in

Req's elig. unlimited & trade-in. Price after 36 mo. credits. Speed restr's & other terms apply. Req's 0% APR 36-mo. agmt and svc. Well-qual. customers. See offer details.

Compare

<https://www.att.com/buy/phones/browse/samsung/>

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Pick your device

1. Pick your device

2. Customize your device

3. Choose your plan

4. Get add-ons

5. Review your cart

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Phones

AT&T PREPAID

Tablets & Laptops

Smartwatches

Hotspots & more

Accessories

Filters

Clear all

5 items

Hide filters

Sort-by: Best-selling

Buy online & pick up at store

Find stores

Delivery Method

Brand

Device condition

Featured

Price range

Color



Netgear

Nighthawk M6 Pro

★ 3.4 | 24

\$12.78/mo.

Req's 0% APR 36-mo. agmt and svc. Well-qual. customers.

See price details



Netgear

Nighthawk M6

★ 3.2 | 12

\$8.62/mo.

Req's 0% APR 36-mo. agmt and svc. Well-qual. customers.

See price details



Franklin

A10

★ 2.5 | 6

\$2.23/mo.

Req's 0% APR 36-mo. agmt and svc. Well-qual. customers.

See price details

<https://www.att.com/buy/connected-devices-and-more/>

The Accused Instrumentalities use different service plans to provide service, for example, to mobile hotspot devices, mobile phones and tablets provisioned with an “unlimited” data plan, mobile phones and tablets provisioned with a prepaid plan, mobile phones and tablets which for which the associated subscriber account has reached its allotted data limit for the service period, and mobile phones and tablets which are specifically communicating with AT&T servers to purchase or increase data allotments (e.g., a AT&T “Add On” options).

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See, e.g.:

Add or change AT&T Prepaid add-ons

Learn how to get or change AT&T Prepaid add-ons for your plan

DETAILED STEPS

Use myAT&T

1. Sign in to att.com/myprepaid.
2. Select **Add-Ons** and then select the button next to the package you want.
3. Choose **Continue**.
4. Follow the prompts to add or change your add-ons.

Use our automated phone service

1. Call **800.901.9878** (611 from your AT&T wireless phone).
2. Follow the prompts to say **More Options**, then **Account changes**.
3. Enter your four-digit password, if prompted.
4. Follow the prompts to say **Buy add-ons**.
5. Select the type of add-ons you want to hear about.
6. Choose the add-on you want.
7. Say **Add it** (press **2**).
8. Follow the prompts to verify your change and confirm your service change.

<https://www.att.com/support/article/wireless/KM1041016/>

	DETAILED INFO <i>Rollover details</i> Data plan rollover Select AT&T Prepaid® monthly and multi-month plans (excluding Unlimited plans) include Rollover Data®.¹ Unused high-speed plan data carries over one 30-day renewal period when your plan renews on time. FYI: Want to check if your plan includes rollover data? Sign in to your AT&T Prepaid account Add-on rollover Make a payment before the end of your current period, and these add-on balances will roll over to the next period: • Data • Hotspot data • International Long Distance <i>Add-on limits</i> You can have more than one add-on, but each add-on has a maximum balance. You can't buy any other add-ons if you go over these limits: • Data: Up to 15GB (Wait to add more data until you use all data included in your current plan. That way, you avoid buying more than you need.) • International Long Distance: Up to 750 minutes FYI: Data balances for AT&T Prepaid products aren't refundable. Want to check your balances? Sign in to your AT&T Prepaid account See all important details https://www.att.com/support/article/wireless/KM1045152/
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AT&T Prepaid Add-On Data

AT&T's Prepaid Data add-on is for those on limited data plans who want to add more. The prices for the various limited data plans include:

- \$25 Prepaid Plan: \$5 for 250MB
- \$30 Prepaid Plan: \$10 for 1GB
- \$40 Prepaid Plan: \$10 for 1GB or \$20 for 3GB

Each of these monthly plan data add-ons is good for 30 days. AT&T also offers a prepaid daily plan as opposed to monthly—this plan, which includes unlimited talk and text, costs \$2/day and you are only charged on the days that you use your phone. Those on this \$2 daily plan can add 100MB for \$1, which is good for 24 hours. In order to buy a data add-on, visit your AT&T Prepaid login at att.com/mypprepaid.

<https://www.comparecellular.com/att/att-prepaid-add-ons/>

AT&T's network receives service plan information from devices which correspond to the subscriber service plan associated with that wireless end-user device, which is a report comprising information about a device service state. For example, AT&T's network receives an attach request, bearer resource allocation request, bearer resource modification request, or PDN connectivity request from a wireless end-user device (UE), which includes a report comprising information about the UE's service state such as UE network capability, UE status, and protocol configuration options (PCO):

Table 8.2.4.1: ATTACH REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 9.2	M	V	1/2
	Security header type	Security header type 9.3.1	M	V	1/2
	Attach request message identity	Message type 9.8	M	V	1
	EPS attach type	EPS attach type 9.9.3.11	M	V	1/2
	NAS key set identifier	NAS key set identifier 9.9.3.21	M	V	1/2
	EPS mobile identity	EPS mobile identity 9.9.3.12	M	LV	5-12
	UE network capability	UE network capability 9.9.3.34	M	LV	3-14
	ESM message container	ESM message container 9.9.3.15	M	LV-E	5-n
19	Old P-TMSI signature	P-TMSI signature 9.9.3.26	O	TV	4
50	Additional GUTI	EPS mobile identity 9.9.3.12	O	TLV	13
52	Last visited registered TAI	Tracking area identity 9.9.3.32	O	TV	6
5C	DRX parameter	DRX parameter 9.9.3.8	O	TV	3
31	MS network capability	MS network capability 9.9.3.20	O	TLV	4-10
13	Old location area identification	Location area identification 9.9.2.2	O	TV	6
9-	TMSI status	TMSI status 9.9.3.31	O	TV	1
11	Mobile station classmark 2	Mobile station classmark 2 9.9.2.4	O	TLV	5
20	Mobile station classmark 3	Mobile station classmark 3 9.9.2.5	O	TLV	2-34
40	Supported Codecs	Supported Codec List 9.9.2.10	O	TLV	5-n
F-	Additional update type	Additional update type 9.9.3.0B	O	TV	1
5D	Voice domain preference and UE's usage setting	Voice domain preference and UE's usage setting 9.9.3.44	O	TLV	3
D-	Device properties	Device properties 9.9.2.0A	O	TV	1
E-	Old GUTI type	GUTI type 9.9.3.45	O	TV	1
C-	MS network feature support	MS network feature support 9.9.3.20A	O	TV	1
10	TMSI based NRI container	Network resource identifier container 9.9.3.24A	O	TLV	4
6A	T3324 value	GPRS timer 2 9.9.3.16A	O	TLV	3
5E	T3412 extended value	GPRS timer 3 9.9.3.16B	O	TLV	3
6E	Extended DRX parameters	Extended DRX parameters 9.9.3.46	O	TLV	3
6F	UE additional security capability	UE additional security capability 9.9.3.53	O	TLV	6
6D	UE status	UE status 9.9.3.54	O	TLV	3
17	Additional information requested	Additional information requested 9.9.3.55	O	TV	2

Table 8.3.8.1: BEARER RESOURCE ALLOCATION REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 9.2	M	V	1/2
	EPS bearer identity	EPS bearer identity 9.3.2	M	V	1/2
	Procedure transaction identity	Procedure transaction identity 9.4	M	V	1
	Bearer resource allocation request message identity	Message type 9.8	M	V	1
	Linked EPS bearer identity	Linked EPS bearer identity 9.9.4.6	M	V	1/2
	Spare half octet	Spare half octet 9.9.2.9	M	V	1/2
	Traffic flow aggregate	Traffic flow aggregate description 9.9.4.15	M	LV	2-256
	Required traffic flow QoS	EPS quality of service 9.9.4.3	M	LV	2-14
27	Protocol configuration options	Protocol configuration options 9.9.4.11	O	TLV	3-253
C-	Device properties	Device properties 9.9.2.0A	O	TV	1
33	NBIFOM container	NBIFOM container 9.9.4.19	O	TLV	3-257
7B	Extended protocol configuration options	Extended protocol configuration options 9.9.4.26	O	TLV-E	4-65538
5C	Extended EPS QoS	Extended quality of service 9.9.4.30	O	TLV	12

Table 8.3.10.1: BEARER RESOURCE MODIFICATION REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 9.2	M	V	1/2
	EPS bearer identity	EPS bearer identity 9.3.2	M	V	1/2
	Procedure transaction identity	Procedure transaction identity 9.4	M	V	1
	Bearer resource modification request message identity	Message type 9.8	M	V	1
	EPS bearer identity for packet filter	Linked EPS bearer identity 9.9.4.6	M	V	1/2
	Spare half octet	Spare half octet 9.9.2.9	M	V	1/2
	Traffic flow aggregate	Traffic flow aggregate description 9.9.4.15	M	LV	2-256
5B	Required traffic flow QoS	EPS quality of service 9.9.4.3	O	TLV	3-15
58	ESM cause	ESM cause 9.9.4.4	O	TV	2
27	Protocol configuration options	Protocol configuration options 9.9.4.11	O	TLV	3-253
C-	Device properties	Device properties 9.9.2.0A	O	TV	1
33	NBIFOM container	NBIFOM container 9.9.4.19	O	TLV	3-257
66	Header compression configuration	Header compression configuration 9.9.4.22	O	TLV	5-257
7B	Extended protocol configuration options	Extended protocol configuration options 9.9.4.26	O	TLV-E	4-65538
5C	Extended EPS QoS	Extended quality of service 9.9.4.30	O	TLV	12

Table 8.3.20.1: PDN CONNECTIVITY REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator 9.2	Protocol discriminator	M	V	1/2
	EPS bearer identity 9.3.2	EPS bearer identity	M	V	1/2
	Procedure transaction identity 9.4	Procedure transaction identity	M	V	1
	PDN connectivity request message identity 9.8	Message type	M	V	1
	Request type	Request type 9.9.4.14	M	V	1/2
	PDN type	PDN type 9.9.4.10	M	V	1/2
D-	ESM information transfer flag 9.9.4.5	ESM information transfer flag	O	TV	1
28	Access point name 9.9.4.1	Access point name	O	TLV	3-102
27	Protocol configuration options 9.9.4.11	Protocol configuration options	O	TLV	3-253
C-	Device properties 9.9.2.0A	Device properties	O	TV	1
33	NBIFOM container 9.9.4.19	NBIFOM container	O	TLV	3-257
66	Header compression configuration 9.9.4.22	Header compression configuration	O	TLV	5-257
7B	Extended protocol configuration options 9.9.4.26	Extended protocol configuration options	O	TLV-E	4-65538

3GPP TS 24.301 v15.03

Flows

There are three scenarios where the PCO value will be passed to the host:

- When a new PCO value has arrived on an activated connection
- When an app or service queries for the latest PCO value from the modem
- When a connection is bridged or activated for the first time and a PCO value already exists in the modem

For the first scenario, the modem should send an [NDIS_STATUS_WWAN_PCO_STATUS](#) notification to the OS indicating a new PCO value change whenever a new PCO value is received from the network, with the appropriate NDIS port number to represent the corresponding PDN. To avoid draining the battery unnecessarily, the modem should avoid noisy notifications, as described in [Modem behavior with Selective Suspend and Connected Standby](#).

For the second scenario, when an app or service queries for PCO value from the modem on an activated PDN connection, the host will send the modem an [OID_WWAN_PCO](#) query request to read the latest cached PCO value in the modem.

For the third scenario, when a connection is activated or bridged on the host, the modem should send an [NDIS_STATUS_WWAN_PCO_STATUS](#) notification when a PCO value already exists in the modem for the activated or bridged connection the host requested. The notification should be passed up from the corresponding NDIS port number of the PDN.

	https://learn.microsoft.com/en-us/windows-hardware/drivers/network/mb-protocol-configuration-options-pco-operations
1[b] determining, based on the report, that a particular service policy setting of the wireless end-user device needs to be modified, the particular service policy setting being stored in a protected partition of the wireless end-user device, the protected partition configured to deter or prevent unauthorized modifications to the particular service policy setting, the particular service policy setting being associated with a service profile that provides for access by the wireless end-user device to a network data service over a wireless access network, the particular service policy setting configured to assist in controlling one or more communications associated with the wireless end-user device over the wireless access network; and	The Accused Instrumentalities comprise “determining, based on the report, that a particular service policy setting of the wireless end-user device needs to be modified, the particular service policy setting being stored in a protected partition of the wireless end-user device, the protected partition configured to deter or prevent unauthorized modifications to the particular service policy setting, the particular service policy setting being associated with a service profile that provides for access by the wireless end-user device to a network data service over a wireless access network, the particular service policy setting configured to assist in controlling one or more communications associated with the wireless end-user device over the wireless access network.” Examples of such service policy settings on the wireless end-user device include, for example, APN access settings and service plan settings stored on the wireless end-user device, including for example in an encrypted partition of the device or in an encrypted SIM card. Such service policy settings are configured to assist in controlling one or more communications associated with the wireless end-user device over the wireless access network, insofar as the policies are used by AT&T to determine the levels of service that are to be provided to the wireless end-user device. Carrier configuration information (which is service profile information) on a given wireless end-user device is secured within the device through the use of privileges and other access settings, including through the use of matching signatures between the carrier settings and one stored with the SIM card information. <i>See, e.g.:</i> Manually update your carrier settings on your iPhone or iPad Carrier settings updates let your carrier provider update carrier network and related settings to improve cellular network connectivity and performance. Carrier settings updates can also add support for new features like 5G or Wi-Fi Calling. When a carrier settings update is available, you'll be prompted to install it. Installation takes less than one minute, and you can keep using your device normally. If your carrier releases a mandatory update, you'll see an OK button instead of an Update button to let you know that the update was downloaded and installed.

<https://support.apple.com/en-us/HT201270>

Carrier Configuration

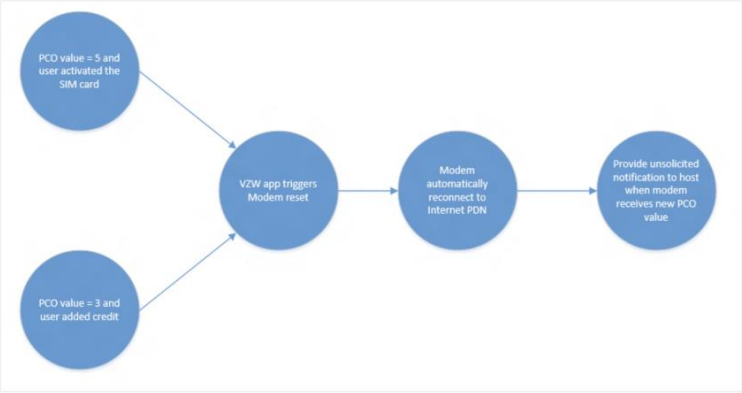
Android 6.0 and higher include a capability for privileged apps to provide carrier-specific configuration to the platform. This functionality, based on the [UICC Carrier Privileges](#) introduced in Android 5.1 (Lollipop MR1), allows carrier configuration to be moved away from the static configuration overlays and gives carriers and OEMs the ability to dynamically provide carrier configuration to the platform through a defined interface.

A properly signed carrier app can either be preloaded in the system image, installed automatically, or manually installed through an app store. The app is queried by the platform to provide configuration for settings including:

- Roaming/nonroaming networks
- Visual voicemail
- SMS/MMS network settings
- VoLTE/IMS configurations

★ **Note:** This app must be signed with the certificate that has a matching signature to one on the SIM. See [How is privilege granted to a carrier app](#) for details.

<https://source.android.com/docs/core/connect/carrier>

	Resetting the modem based on PCO values Based on PCO values received from the network, the modem will be reset in the following scenarios: • The user completed self-activation after receiving PCO = 5 from the network. A new PCO value (3, 0 or anything Mobile Operator App can recognize) will be sent to the OS and the OS will pass it to Mobile Operator App. • The user added more credit to their account after receiving PCO = 3. A new PCO value (0, or anything Mobile Operator App can recognize) will be sent to the OS and the OS will pass it to Mobile Operator App. The host is not aware of the modem being reset, so the activated connections from the host will not be deactivated and the modem should automatically re-establish connection with those PDN after resetting. Upon establishing connection and receiving a new incoming PCO value from the network, the modem will provide an unsolicited <code>NDIS_STATUS_WWAN_PCO_STATUS</code> notification to the host. The following diagram illustrates the modem's reset flow when one of these scenarios occurs, with Verizon Wireless as the example MO:  <pre> graph LR A((PCO value = 5 and user activated the SIM card)) --> C((VZW app triggers Modem reset)) B((PCO value = 3 and user added credit)) --> C C --> D((Modem automatically reconnects to Internet PDN)) D --> E((Provide unsolicited notification to host when modem receives new PCO value)) </pre> https://learn.microsoft.com/en-us/windows-hardware/drivers/network/mb-protocol-configuration-options-pco-operations
1[c] in response to determining that the particular service policy setting needs to be modified, sending configuration information to the wireless end-user device over the service control link, the configuration information configured to assist in modifying or allowing	The Accused Instrumentalities comprise receiving a report comprising device service states “in response to determining that the particular service policy setting needs to be modified, sending configuration information to the wireless end-user device over the service control link, the configuration information configured to assist in modifying or allowing modifications to the particular service policy setting.” AT&T’s network makes determinations that particular service policies for user devices need to be changed when, for example, a subscriber’s service plan is changed or service-related options are activated or deactivated (e.g., where the extra data Add On option is applied or not applied).

modifications to the particular service policy setting.

On information and belief, the Accused Instrumentalities specifically transmit traffic control-related instructions to mobile devices in the wireless access network based on type of traffic, type of subscriber plan, and priority levels for types of data and/or subscriber account type based on the Accused Instrumentalities' inspection of traffic to and from the device and the account associated with the device. For example, the Accused Instrumentalities inspect data traffic to determine if it is for streaming video to devices, and manages data access by that device accordingly.

See, e.g.:

Learn about Video Management

Learn about our video policy, and how to manage video settings for each eligible line.

★ INSTRUCTIONS & INFO

About Video Management

Our Video Management feature (formerly Stream Saver®) applies automatically and strives to render streaming video in standard-definition (SD), with a max speed of 2Mbps if you have both a 5G-enabled device and rate plan, or 1.5Mbps if you don't. This speed is perfect for streaming video on a smartphone and may help control data usage.

Most of our wireless plans include one of the following video streaming options: standard-definition (SD), high-definition (HD), or 4K ultra high-definition (UHD). For plans with only SD streaming, the Video Management feature stays on. In most cases, if your plan includes HD or 4K UHD, you can stream in SD by keeping the setting on. To experience higher definition streaming, or if you have any issues, you can turn it off online any time. With the feature turned off, you may use more data.

With Video Management on, other content bundled by content providers with streaming video may be impacted and slowed. This includes content such as video downloads, filters, lenses, and catalogs. Some streaming video can't be identified. At times, we may deliver video content faster or at higher definition.

FYI: If you're a provider of video content and have questions about our video management policy, contact us at g0530@att.com

Manage video settings

To experience HD or 4K UHD video where available, or if you have issues, you can turn Video Management off or back on for each eligible line.

<https://www.att.com/support/article/wireless/KM1169198/>

Manually update your carrier settings on your iPhone or iPad

Carrier settings updates let your carrier provider update carrier network and related settings to improve cellular network connectivity and performance. Carrier settings updates can also add support for new features like 5G or Wi-Fi Calling.

When a carrier settings update is available, you'll be prompted to install it. Installation takes less than one minute, and you can keep using your device normally. If your carrier releases a mandatory update, you'll see an OK button instead of an Update button to let you know that the update was downloaded and installed.

<https://support.apple.com/en-us/HT201270>

Carrier Configuration

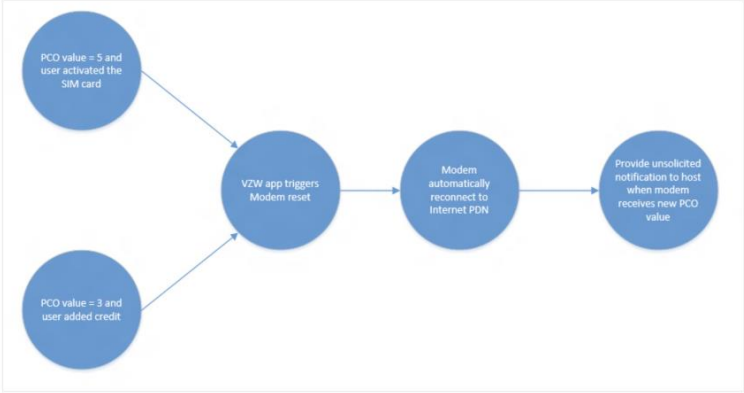
Android 6.0 and higher include a capability for privileged apps to provide carrier-specific configuration to the platform. This functionality, based on the [UICC Carrier Privileges](#) introduced in Android 5.1 (Lollipop MR1), allows carrier configuration to be moved away from the static configuration overlays and gives carriers and OEMs the ability to dynamically provide carrier configuration to the platform through a defined interface.

A properly signed carrier app can either be preloaded in the system image, installed automatically, or manually installed through an app store. The app is queried by the platform to provide configuration for settings including:

- Roaming/nonroaming networks
- Visual voicemail
- SMS/MMS network settings
- VoLTE/IMS configurations

★ **Note:** This app must be signed with the certificate that has a matching signature to one on the SIM. See [How is privilege granted to a carrier app](#) for details.

<https://source.android.com/docs/core/connect/carrier>

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2. The method of claim 1, wherein the particular service policy setting assists in implementing a roaming control, a parental control, or an enterprise wireless wide-area network (WWAN) management control.	The Accused Instrumentalities comprise the particular service policy setting assists in implementing a roaming control. On information and belief, the protocol configuration options information assists in modifying the service policy setting which controls cellular communications, including when the mobile device is roaming. <i>See, e.g.:</i>

Carrier Configuration

Android 6.0 and higher include a capability for privileged apps to provide carrier-specific configuration to the platform. This functionality, based on the [UICC Carrier Privileges](#) introduced in Android 5.1 (Lollipop MR1), allows carrier configuration to be moved away from the static configuration overlays and gives carriers and OEMs the ability to dynamically provide carrier configuration to the platform through a defined interface.

A properly signed carrier app can either be preloaded in the system image, installed automatically, or manually installed through an app store. The app is queried by the platform to provide configuration for settings including:

- Roaming/nonroaming networks
- Visual voicemail
- SMS/MMS network settings
- VoLTE/IMS configurations

★ **Note:** This app must be signed with the certificate that has a matching signature to one on the SIM. See [How is privilege granted to a carrier app](#) for details.

<https://source.android.com/docs/core/connect/carrier>

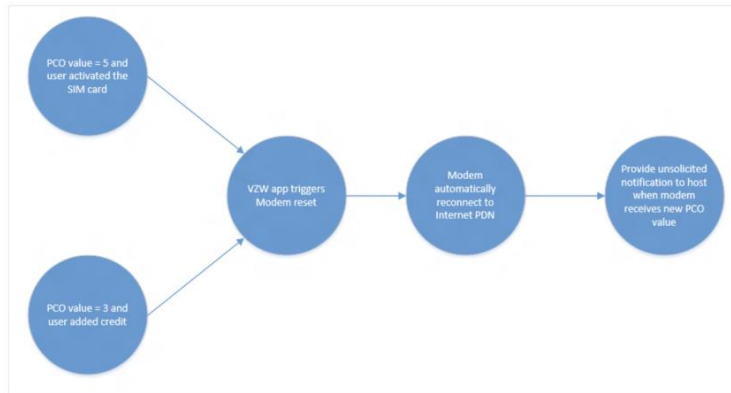
Resetting the modem based on PCO values

Based on PCO values received from the network, the modem will be reset in the following scenarios:

- The user completed self-activation after receiving PCO = 5 from the network. A new PCO value (3, 0 or anything Mobile Operator App can recognize) will be sent to the OS and the OS will pass it to Mobile Operator App.
- The user added more credit to their account after receiving PCO = 3. A new PCO value (0, or anything Mobile Operator App can recognize) will be sent to the OS and the OS will pass it to Mobile Operator App.

The host is not aware of the modem being reset, so the activated connections from the host will not be deactivated and the modem should automatically re-establish connection with those PDN after resetting. Upon establishing connection and receiving a new incoming PCO value from the network, the modem will provide an unsolicited `NDIS_STATUS_WWAN_PCO_STATUS` notification to the host.

The following diagram illustrates the modem's reset flow when one of these scenarios occurs, with Verizon Wireless as the example MO:



<https://learn.microsoft.com/en-us/windows-hardware/drivers/network/mb-protocol-configuration-options-pco-operations>

The Accused Instrumentalities comprise the particular service policy setting assists in implementing an enterprise wireless wide-area network (WWAN) management control. On information and belief, the protocol configuration options information assists in modifying the service policy setting which controls cellular communications, including when the mobile device is used in an enterprise. *See, e.g.:*

Partner device enrollment programs

Use these programs to enroll your devices in Enterprise Mobility Management (EMM) or Unified Endpoint Management (UEM) solutions*

Android zero-touch enrollment (ZTE)

Manage your device deployment with AT&T and Google. ZTE offers a seamless deployment for all Android devices, making large scale roll-outs fast and easy.

Learn more

Apple Business Manager

Enables automated enrollment and configuration of your corporate-owned Apple devices in addition to streamlined device setup and deployment.

Learn more

Samsung Knox Mobile Enrollment

Helps you manage deployments, maintain security, promote productivity, and control your Samsung devices right out of the box.

Learn more



Automatically control mobile devices on your network with Apple® Business Manager



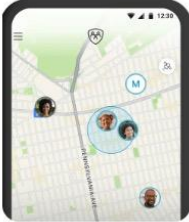
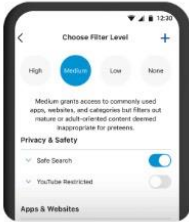
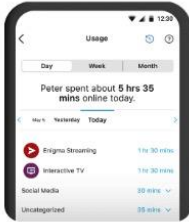
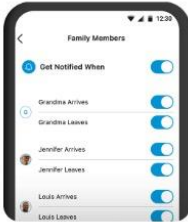
Control mobile devices on your network right out of the box with Samsung and AT&T



Control your mobile devices with Google® and AT&T

<https://www.business.att.com/products/device-management-program.html>

The Accused Instrumentalities comprise the particular service policy setting assists in implementing parental controls. On information and belief, the protocol configuration options information assists in modifying the service policy setting which controls cellular communications, including when the mobile device is used in a family account. *See, e.g.:*

	AT&T Secure Family® Peace of mind just got a lot easier® Know where your kids are, manage their screen time and limit what they access online. Try it FREE for your first 30 days. \$7.99/mo. after your first 30 days After the first 30 days, it's \$7.99/mo. (includes support for up to 10 family members and up to 30 devices). Renews monthly, auto billed to your AT&T account. Cancel anytime. See details Top safety features  Location tracking Track family member's devices in real-time on an interactive map, or track their location history on a breadcrumb trail map. Availability, timeliness, or accuracy of device location not guaranteed. Coverage not available everywhere.  Control what they access Filter or block apps and online content based on age-appropriate settings and set time limits for internet access and app usage.  Double check their online activities View your child's internet and app usage for the last 30 days, and temporarily halt their internet access when it's time for homework, bed, or dinner.  Set location alerts Get alerts when your child enters or leaves a saved area, or schedule alerts for additional peace of mind. Availability, timeliness, or accuracy of device location not guaranteed. Coverage not available everywhere.  SOS alerts One press of a button sends an SOS alert to the whole family. https://www.att.com/security/secure-family-app/
3. The method of claim 1, wherein the wireless end-user device is an intermediate networking device for	The Accused Instrumentalities comprise sending configuration information to the wireless end-user device wherein the wireless end-user device is an intermediate networking device for

forwarding traffic between a wireless wide-area network (WWAN) and a wireless local-area network (WLAN).	forwarding traffic between a wireless wide-area network (WWAN) and a wireless local-area network (WLAN). Mobile devices such as phones, tablets, and hotspot access points which communicate with the AT&T wireless service network (a wireless wide-area network (WWAN)) and have a mobile hotspot feature are intermediate networking devices that forward traffic between AT&T's network (WWAN) and a local WiFi network (WLAN). <i>See, e.g.:</i> Review your plan Use a compatible smartphone or tablet on these voice and data plans that include mobile hotspot data: • AT&T unlimited plans: AT&T Unlimited Premium[®], AT&T Unlimited ExtraSM, AT&T Unlimited StarterSM, AT&T Unlimited Elite[®], AT&T Unlimited &More PremiumSM, AT&T Unlimited Enhanced PlusSM, and AT&T Unlimited PlusSM • AT&T 4GBSM • All AT&T Mobile Share[®] plans • AT&T Prepaid[®] monthly plans: \$75, \$65, \$50, \$45, \$35, and multi-month plans. FYI: AT&T may temporarily slow data speeds if the network is busy. Don't have one of these plans? Learn how to change your wireless plan or AT&T Prepaid plan. Need more hotspot data? See options for adding hotspot data.
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AT&T Unlimited Premium® plan

\$50.00

/mo. per line

when you get 4 lines

Select plan

Here's what you'll get: ^

Unlimited talk, text, & high-speed data that can't slow down based on how much you use

AT&T ActiveArmor™ advanced mobile security. Free app with Public Wi-Fi Protection, Identity Monitoring, and more.

50GB hotspot data per line per month ⓘ

AT&T Unlimited Extra® plan

\$40.00

/mo. per line

when you get 4 lines

Select plan

Here's what you'll get: ^

Unlimited talk, text, data + 50GB of Premium Data

AT&T ActiveArmor™ advanced mobile security. Free app with Public Wi-Fi Protection, Identity Monitoring, and more.

15GB hotspot data per line per month ⓘ

AT&T Unlimited Starter® plan

\$35.00

/mo. per line

when you get 4 lines

Select plan

Here's what you'll get: ^

Unlimited talk, text & data

AT&T ActiveArmor™ mobile security ⓘ

3GB hotspot data per line per month ⓘ

Standard-definition streaming

<https://www.att.com/plans/wireless/>

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Headwater Partners I LLC
Ex. 2028, IPR2024-00809
Page 24 of 48

	10GB hotspot included AT&T Prepaid 12-month Unlimited \$25.00/mo. plus taxes and fees. when you prepay \$300 for 12 months After 16GB, speeds slowed to max 15Mbps for the month. Req's new single line and \$300 prepayment. Taxes extra. Terms & restr's apply. See details Shop now Here's what you'll get: ^ - Unlimited talk, text, & data 5G 5G access included¹ - Unlimited text from the U.S. to over 230 countries - Checks Calls to Canada and Mexico from the U.S. - AT&T ActiveArmor mobile security² Fraud call blocking & more. 10GB Mobile hotspot - Standard-definition streaming 5GB hotspot included AT&T Prepaid Unlimited ~~\$65.00~~ \$50.00/mo. with AutoPay* \$65/mo. without AutoPay AT&T may temporarily slow data speeds if the network is busy. Taxes & fees extra. See details Shop now Here's what you'll get: ^ - Unlimited talk, text, & high-speed data 5G 5G access included¹ - Unlimited text from the U.S. to over 230 countries - Checks Unlimited talk, text & data in and between Mexico & Canada Limit 25GB in Canada, 5G in U.S. only. - AT&T ActiveArmor mobile security² Fraud call blocking & more. 5GB mobile hotspot - Standard-definition streaming 5G included AT&T Prepaid 5GB \$30.00/mo. plus taxes and fees. After high-speed data is used, speed slowed to a max of 128 Kbps for rest of term. Taxes & fees extra. Shop now Here's what you'll get: ^ - Unlimited talk, text, & 5GB high-speed data 5G 5G access included¹ - Unlimited text from the U.S. to over 230 countries - AT&T ActiveArmor mobile security² Fraud call blocking & more. - Mobile hotspot Turn your phone into a hotspot. Uses plan data allotment. - Standard-definition streaming - Rollover Data Unused data rolls over to the next month. https://www.att.com/prepaid/plans/
4. The method of claim 1, wherein the wireless end-user device is an intermediate networking device comprising a cellular device, the	The Accused Instrumentalities comprise sending configuration information to the wireless end-user device wherein the wireless end-user device is an intermediate networking device comprising a cellular device, the intermediate networking device for forwarding traffic between the wireless access network and a second network.

intermediate networking device for forwarding traffic between the wireless access network and a second network.	Mobile devices such as phones, tablets, and hotspot access points (cellular devices) which communicate with the AT&T wireless service network (a wireless wide-area network (WWAN)) and have a mobile hotspot feature are intermediate networking devices that forward traffic between AT&T's network (WWAN) and a local WiFi network (WLAN). Review your plan Use a compatible smartphone or tablet on these voice and data plans that include mobile hotspot data: • AT&T unlimited plans: AT&T Unlimited Premium[®], AT&T Unlimited ExtraSM, AT&T Unlimited StarterSM, AT&T Unlimited Elite[®], AT&T Unlimited &More PremiumSM, AT&T Unlimited Enhanced PlusSM, and AT&T Unlimited PlusSM • AT&T 4GBSM • All AT&T Mobile Share[®] plans • AT&T Prepaid[®] monthly plans: \$75, \$65, \$50, \$45, \$35, and multi-month plans. FYI: AT&T may temporarily slow data speeds if the network is busy. Don't have one of these plans? Learn how to change your wireless plan or AT&T Prepaid plan. Need more hotspot data? See options for adding hotspot data.
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5. The method of claim 1, wherein the wireless end-user device is an intermediate networking device, and the particular service policy setting assists	The Accused Instrumentalities comprise sending configuration information to the wireless end-user device wherein the wireless end-user device is an intermediate networking device, and the particular service policy setting assists one or more other end-user devices in communicating

one or more other end-user devices in communicating over the wireless access network via the intermediate networking device.

over the wireless access network via the intermediate networking device. *See claim 4; see also, e.g.:*

Manually update your carrier settings on your iPhone or iPad

Carrier settings updates let your carrier provider update carrier network and related settings to improve cellular network connectivity and performance. Carrier settings updates can also add support for new features like 5G or Wi-Fi Calling.

When a carrier settings update is available, you'll be prompted to install it. Installation takes less than one minute, and you can keep using your device normally. If your carrier releases a mandatory update, you'll see an OK button instead of an Update button to let you know that the update was downloaded and installed.

<https://support.apple.com/en-us/HT201270>

Carrier Configuration

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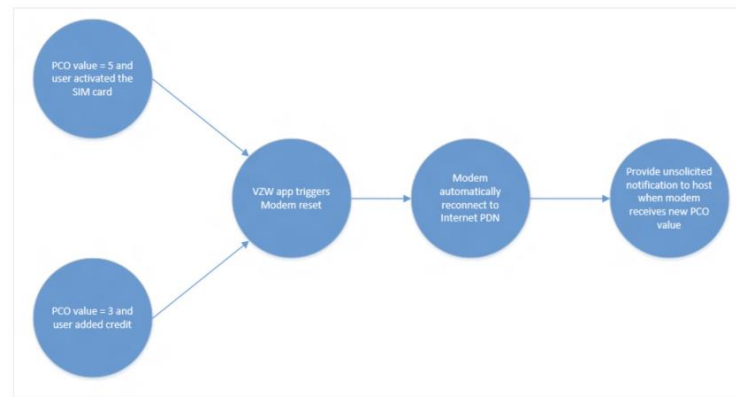
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The host is not aware of the modem being reset, so the activated connections from the host will not be deactivated and the modem should automatically re-establish connection with those PDN after resetting. Upon establishing connection and receiving a new incoming PCO value from the network, the modem will provide an unsolicited `NDIS_STATUS_WWAN_PCO_STATUS` notification to the host.

The following diagram illustrates the modem's reset flow when one of these scenarios occurs, with Verizon Wireless as the example MO:



<https://learn.microsoft.com/en-us/windows-hardware/drivers/network/mb-protocol-configuration-options-pco-operations>

As another example, the Accused Instrumentalities comprise sending configuration information to the wireless end-user device wherein the wireless end-user device is an intermediate networking device, and the particular service policy setting assists one or more other end-user devices in communicating over the wireless access network via the intermediate networking device. *See claim 4; see also, e.g.:*

About Bluetooth, Wi-Fi, and cellular on your Apple Watch

Learn about Bluetooth and Wi-Fi for your Apple Watch and how your watch uses both. And learn how cellular on GPS + Cellular models fits in.



To enjoy every feature on your Apple Watch, you need to turn on Wi-Fi and Bluetooth on your [paired iPhone](#). [Open Control Center](#) on your iPhone, then make sure that Wi-Fi  and Bluetooth  are on.

Your Apple Watch uses Wi-Fi and Bluetooth to communicate with your paired iPhone. If you have cellular, your watch can also stay connected through a cellular network. Your watch switches between these intelligently to choose the most power-efficient connection. Here's how:

- Your Apple Watch uses Bluetooth when your iPhone is near, which conserves power.
- If Bluetooth isn't available, your Apple Watch will try to use Wi-Fi. For example, if [compatible Wi-Fi](#) is available and your iPhone isn't in Bluetooth range, your Apple Watch uses Wi-Fi.
- If Bluetooth and Wi-Fi aren't available, and you set up a cellular plan, cellular models of Apple Watch can connect to cellular networks.

<https://support.apple.com/en-us/HT204562>

	 Activate your smartwatch Smartwatches use an eSIM to connect to the AT&T network. We'll take you step by step through the activation process. Apple Watch Steps to download your eSIM: 1. Make sure your phone is turned on and nearby. 2. Turn on your new Apple Watch®. 3. Open the Watch app on your phone. 4. Follow the prompts to pair Apple watch with your phone. 5. Follow the prompts to set up cellular service using NumberSync. Already pair your watch with your phone? Open the Watch app on your phone, select General, then Cellular, and lastly, Set Up Cellular. Then, follow the prompts to set up NumberSync. If your watch still doesn't have wireless service, activate your watch now. Android smartwatch If you haven't already, make sure you get a wireless plan for your Android® watch. Then, download your eSIM: 1. Turn on your watch. 2. Open the wearable app on your phone and pair your watch. 3. Let the eSIM download automatically or follow the prompts to download it by scanning the QR code on your eSIM activation card from AT&T. 4. Activate NumberSync to sync your AT&T phone number and watch. You may need an AT&T user ID linked to the phone that you want to sync. If your Android watch still doesn't have wireless service, activate your watch now. https://www.att.com/support/how-to/wireless/accessory-get-started/	Feedback
6. The method of claim 1, further comprising: obtaining a service usage measure, the service usage measure accounting for the one or more communications associated with the wireless end-user device over the wireless access network; and	The Accused Instrumentalities comprise obtaining a service usage measure that includes a measure of service usage activity, the service usage measure accounting for the one or more communications associated with the wireless end-user device over the wireless access network; and based on the service usage measure, taking an action. On information and belief, the Accused Instrumentalities obtain a service usage measure accounting for communications associated with the mobile device over AT&T's wireless access	

based on the service usage measure, taking an action.	network, including a measure of service usage activity such as information indicating overall cellular data usage and mobile hotspot data usage for the service period. Based on the service usage measure, the Accused Instrumentalities take an action such as sending configuration information that modifies a policy setting to allow, block or throttle cellular data usage or mobile hotspot data usage. See claim 1. See also, e.g.: How do I check my AT&T wireless data usage online? • Data: Shows internet, app, and iMessage or Advanced messaging used on the AT&T mobile network • Hotspot: Shows hotspot usage on the AT&T mobile network. • Text: Displays SMS or MMS messages sent or received over the AT&T mobile network • Talk: Shows incoming and outgoing calls made over the AT&T mobile network • Mobile purchases: Displays individual purchases made by line Usage reporting delays We update your usage reports as quickly as we can. Sometimes, though, your usage info may be unavailable or delayed. It can take two to five days for data use to post in myAT&T, so amounts shown online may not reflect all use since your last bill • Time stamps for current data or text usage may be off by up to 4 hours in myAT&T. Here are some things to keep in mind: • We usually update recent data use every three hours. • You may not be able to see usage online if you have a new account or changed your plan in the middle of a bill period. https://www.att.com/support/article/wireless/KM1009269/ Want to manage data use right from your mobile device? Get the myAT&T app. Text and data rates may apply for download and use. https://www.att.com/support/article/wireless/KM1011301/
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7. The method of claim 6, wherein the service usage measure comprises a measure of a service usage activity.	The Accused Instrumentalities comprise obtaining a service usage measure that includes a measure of service usage activity, the service usage measure accounting for the one or more communications associated with the wireless end-user device over the wireless access network; and based on the service usage measure, taking an action. On information and belief, the Accused Instrumentalities obtain a service usage measure accounting for communications associated with the mobile device over AT&T's wireless access network, including a measure of service usage activity such as information indicating overall cellular data usage and mobile hotspot data usage for the service period. Based on the service usage measure, the Accused Instrumentalities take an action such as sending configuration information that modifies a policy setting to allow, block or throttle cellular data usage or mobile hotspot data usage. See claim 6.
8. The method of claim 6, wherein the action is to verify the service usage measure.	The Accused Instrumentalities comprise obtaining a service usage measure that includes a measure of service usage activity, the service usage measure accounting for the one or more communications associated with the wireless end-user device over the wireless access network; and based on the service usage measure, taking an action, wherein the action is to verify the service usage measure. On information and belief, based on the service usage measure indicating overall cellular data usage and mobile hotspot data usage for the service period, the Accused Instrumentalities verify the service usage measure to ensure that it accounts for the actual service usage of the mobile device. See claim 6.
9. The method of claim 6, wherein the action is to quarantine or suspend the wireless end-user device.	The Accused Instrumentalities comprise obtaining a service usage measure, the service usage measure accounting for the one or more communications associated with the wireless end-user device over the wireless access network; and based on the service usage measure, taking an action to quarantine or suspend the wireless end-user device. On information and belief, the Accused Instrumentalities obtain a service usage measure indicating a prohibited service usage activity under AT&T's Acceptable Use Policy, and based on the service measure, quarantine or suspend the mobile device.

2.5 Prohibited Uses of Wireless Services

Our wireless network is a shared resource, which we manage for the benefit of all of our customers. To ensure the activities of some users do not impair the ability of all our customers to have access to reliable services provided at reasonable costs, we forbid certain activities and uses ("Prohibited Network Uses"). We may take any and all reasonable actions necessary to prevent and stop Prohibited Network Uses or any other violation of AT&T's [Acceptable Use Policy](#). Prohibited Network Uses include use of AT&T Wireless Service that, in AT&T's sole determination:

- hinders other customers' access to the wireless network;
- involves a mechanism that is used to originate, amplify, enhance, retransmit or generate a radio frequency signal without our permission;
- negatively affects our network or compromises network security or capacity;
- excessively and disproportionately contributes to network congestion;
- adversely impacts network service levels or legitimate data flows;
- degrades network performance;
- causes harm to other customers;
- tethers a wireless Device to a computing device if you have not subscribed to a rate plan with a tethering feature;
- uses any Device for Wireless Service with an ineligible rate plan;
- constitutes the reselling of any Wireless Service; or
- is excessive or unreasonable.

2.7 AT&T's Rights to Change, Reduce, Cancel, Suspend, Interrupt or Terminate Wireless Service or the Agreement

AT&T can take any and all actions necessary to protect the AT&T wireless network, ensure compliance with this Agreement and prevent and/or stop Prohibited Network Uses. AT&T may also change, reduce, interrupt, suspend, limit or cancel your Wireless Service or terminate your Agreement without advance notice for any reason, including, but not limited to the following actions by you or any user of your Device or on your Account:

- misconduct described by subsection 1.5;
- living or predominantly using Wireless Service outside of the AT&T owned and operated domestic network coverage area;
- exceeding our off-net roaming usage allowances; and
- engaging or attempting to engage in Prohibited Network Uses.

<https://www.att.com/legal/terms.consumerServiceAgreement.html>

12. The method of claim 1, wherein the configuration information comprises at least a portion of the service profile.	The Accused Instrumentalities comprise sending the configuration information, wherein the configuration information comprises a portion of the service profile stored in an encrypted partition of the device or in an encrypted SIM card. See claim 1.
13. The method of claim 1, wherein the service control link is secured by an encryption protocol.	The Accused Instrumentalities comprise sending configuration information over the service control link, wherein the service control link is secured by an encryption protocol. 4.4.4 Integrity protection of NAS signalling messages 4.4.4.1 General For the UE, integrity protected signalling is mandatory for the NAS messages once a valid EPS security context exists and has been taken into use. For the network, integrity protected signalling is mandatory for the NAS messages once a secure exchange of NAS messages has been established for the NAS signalling connection. Integrity protection of all NAS signalling messages is the responsibility of the NAS. It is the network which activates integrity protection. 4.4.4.3 Integrity checking of NAS signalling messages in the MME Except the messages listed below, no NAS signalling messages shall be processed by the receiving EMM entity in the MME or forwarded to the ESM entity, unless the secure exchange of NAS messages has been established for the NAS signalling connection: - EMM messages: - ATTACH REQUEST;

	6.1.1 General This clause describes the procedures used for EPS session management (ESM) at the radio interface (reference point "LTE-Uu"). The main function of the ESM sublayer is to support the EPS bearer context handling in the UE and in the MME. The ESM comprises procedures for: - the activation, deactivation and modification of EPS bearer contexts; - the request for resources (IP connectivity to a PDN or dedicated bearer resources) by the UE; and - the transport of user data via the control plane between the UE and the MME. Each EPS bearer context represents an EPS bearer between the UE and a PDN. EPS bearer contexts can remain activated even if the radio and S1 bearers constituting the corresponding EPS bearers between UE and MME are temporarily released. An EPS bearer context can be either a default bearer context or a dedicated bearer context. A default EPS bearer context is activated when the UE requests a connection to a PDN. Generally, ESM procedures can be performed only if an EMM context has been established between the UE and the MME, and the secure exchange of NAS messages has been initiated by the MME by use of the EMM procedures described in clause 5. The first default EPS bearer context, however, can be activated during the EPS attach procedure (see subclause 4.2). Once the UE is successfully attached, and the first default EPS bearer context has been activated during or after the attach procedure, the UE can request the MME to set up connections to additional PDNs. For each additional connection, the MME will activate a separate default EPS bearer context. A default EPS bearer context remains activated throughout the lifetime of the connection to the PDN. 6.1.2 Types of ESM procedures ***
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	2) Transaction related procedures: These procedures are initiated by the UE to request for resources, i.e. a new PDN connection or dedicated bearer resources, or to release these resources: - PDN connectivity procedure; - PDN disconnect procedure; - bearer resource allocation procedure; - bearer resource modification procedure. 3GPP TS 24.301 v15.03
14. The method of claim 1, wherein the device service state comprises a service profile setting, a service usage policy setting, or a device-assisted services (DAS) setting.	The Accused Instrumentalities comprise receiving, over a service control link, a report from a wireless end-user device, the report comprising information about a device service state, wherein the device service state comprises a service profile setting, a service usage policy setting, or a device-assisted services (DAS) setting. See claim 1. See also, e.g.: Manually update your carrier settings on your iPhone or iPad Carrier settings updates let your carrier provider update carrier network and related settings to improve cellular network connectivity and performance. Carrier settings updates can also add support for new features like 5G or Wi-Fi Calling. When a carrier settings update is available, you'll be prompted to install it. Installation takes less than one minute, and you can keep using your device normally. If your carrier releases a mandatory update, you'll see an OK button instead of an Update button to let you know that the update was downloaded and installed. https://support.apple.com/en-us/HT201270

Carrier Configuration

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<https://source.android.com/docs/core/connect/carrier>

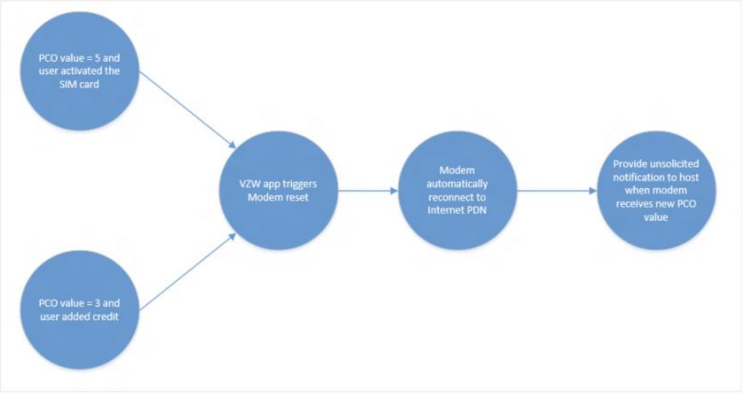
	Resetting the modem based on PCO values Based on PCO values received from the network, the modem will be reset in the following scenarios: • The user completed self-activation after receiving PCO = 5 from the network. A new PCO value (3, 0 or anything Mobile Operator App can recognize) will be sent to the OS and the OS will pass it to Mobile Operator App. • The user added more credit to their account after receiving PCO = 3. A new PCO value (0, or anything Mobile Operator App can recognize) will be sent to the OS and the OS will pass it to Mobile Operator App. The host is not aware of the modem being reset, so the activated connections from the host will not be deactivated and the modem should automatically re-establish connection with those PDN after resetting. Upon establishing connection and receiving a new incoming PCO value from the network, the modem will provide an unsolicited <code>NDIS_STATUS_WWAN_PCO_STATUS</code> notification to the host. The following diagram illustrates the modem's reset flow when one of these scenarios occurs, with Verizon Wireless as the example MO:  <pre> graph LR A((PCO value = 5 and user activated the SIM card)) --> C[VZW app triggers Modem reset] B((PCO value = 3 and user added credit)) --> C C --> D((Modem automatically reconnects to Internet PDN)) D --> E((Provide unsolicited notification to host when modem receives new PCO value)) </pre> https://learn.microsoft.com/en-us/windows-hardware/drivers/network/mb-protocol-configuration-options-pco-operations
16. The method of claim 1, wherein the device service state comprises information associated with an encryption key.	The Accused Instrumentalities comprise receiving, over a service control link, a report from a wireless end-user device, the report comprising information about a device service state, wherein the device service state comprises information associated with an encryption key. <i>See, e.g.:</i>

Table 8.2.4.1: ATTACH REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 9.2	M	V	1/2
	Security header type	Security header type 9.3.1	M	V	1/2
	Attach request message identity	Message type 9.8	M	V	1
	EPS attach type	EPS attach type 9.9.3.11	M	V	1/2
	NAS key set identifier	NAS key set identifier 9.9.3.21	M	V	1/2
	EPS mobile identity	EPS mobile identity 9.9.3.12	M	LV	5-12
	UE network capability	UE network capability 9.9.3.34	M	LV	3-14
	ESM message container	ESM message container 9.9.3.15	M	LV-E	5-n
19	Old P-TMSI signature	P-TMSI signature 9.9.3.26	O	TV	4
50	Additional GUTI	EPS mobile identity 9.9.3.12	O	TLV	13
52	Last visited registered TAI	Tracking area identity 9.9.3.32	O	TV	6
5C	DRX parameter	DRX parameter 9.9.3.8	O	TV	3
31	MS network capability	MS network capability 9.9.3.20	O	TLV	4-10
13	Old location area identification	Location area identification 9.9.2.2	O	TV	6
9-	TMSI status	TMSI status 9.9.3.31	O	TV	1
11	Mobile station classmark 2	Mobile station classmark 2 9.9.2.4	O	TLV	5
20	Mobile station classmark 3	Mobile station classmark 3 9.9.2.5	O	TLV	2-34
40	Supported Codecs	Supported Codec List 9.9.2.10	O	TLV	5-n
F-	Additional update type	Additional update type 9.9.3.0B	O	TV	1
5D	Voice domain preference and UE's usage setting	Voice domain preference and UE's usage setting 9.9.3.44	O	TLV	3
D-	Device properties	Device properties 9.9.2.0A	O	TV	1
E-	Old GUTI type	GUTI type 9.9.3.45	O	TV	1
C-	MS network feature support	MS network feature support 9.9.3.20A	O	TV	1
10	TMSI based NRI container	Network resource identifier container 9.9.3.24A	O	TLV	4
6A	T3324 value	GPRS timer 2 9.9.3.16A	O	TLV	3
5E	T3412 extended value	GPRS timer 3 9.9.3.16B	O	TLV	3
6E	Extended DRX parameters	Extended DRX parameters 9.9.3.46	O	TLV	3
6F	UE additional security capability	UE additional security capability 9.9.3.53	O	TLV	6
6D	UE status	UE status 9.9.3.54	O	TLV	3
17	Additional information requested	Additional information requested 9.9.3.55	O	TV	2

Table 8.3.8.1: BEARER RESOURCE ALLOCATION REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 9.2	M	V	1/2
	EPS bearer identity	EPS bearer identity 9.3.2	M	V	1/2
	Procedure transaction identity	Procedure transaction identity 9.4	M	V	1
	Bearer resource allocation request message identity	Message type 9.8	M	V	1
	Linked EPS bearer identity	Linked EPS bearer identity 9.9.4.6	M	V	1/2
	Spare half octet	Spare half octet 9.9.2.9	M	V	1/2
	Traffic flow aggregate	Traffic flow aggregate description 9.9.4.15	M	LV	2-256
	Required traffic flow QoS	EPS quality of service 9.9.4.3	M	LV	2-14
27	Protocol configuration options	Protocol configuration options 9.9.4.11	O	TLV	3-253
C-	Device properties	Device properties 9.9.2.0A	O	TV	1
33	NBIFOM container	NBIFOM container 9.9.4.19	O	TLV	3-257
7B	Extended protocol configuration options	Extended protocol configuration options 9.9.4.26	O	TLV-E	4-65538
5C	Extended EPS QoS	Extended quality of service 9.9.4.30	O	TLV	12

Table 8.3.10.1: BEARER RESOURCE MODIFICATION REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 9.2	M	V	1/2
	EPS bearer identity	EPS bearer identity 9.3.2	M	V	1/2
	Procedure transaction identity	Procedure transaction identity 9.4	M	V	1
	Bearer resource modification request message identity	Message type 9.8	M	V	1
	EPS bearer identity for packet filter	Linked EPS bearer identity 9.9.4.6	M	V	1/2
	Spare half octet	Spare half octet 9.9.2.9	M	V	1/2
	Traffic flow aggregate	Traffic flow aggregate description 9.9.4.15	M	LV	2-256
5B	Required traffic flow QoS	EPS quality of service 9.9.4.3	O	TLV	3-15
58	ESM cause	ESM cause 9.9.4.4	O	TV	2
27	Protocol configuration options	Protocol configuration options 9.9.4.11	O	TLV	3-253
C-	Device properties	Device properties 9.9.2.0A	O	TV	1
33	NBIFOM container	NBIFOM container 9.9.4.19	O	TLV	3-257
66	Header compression configuration	Header compression configuration 9.9.4.22	O	TLV	5-257
7B	Extended protocol configuration options	Extended protocol configuration options 9.9.4.26	O	TLV-E	4-65538
5C	Extended EPS QoS	Extended quality of service 9.9.4.30	O	TLV	12

Table 8.3.20.1: PDN CONNECTIVITY REQUEST message content					
IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 9.2	M	V	1/2
	EPS bearer identity	EPS bearer identity 9.3.2	M	V	1/2
	Procedure transaction identity	Procedure transaction identity 9.4	M	V	1
	PDN connectivity request message identity	Message type 9.8	M	V	1
	Request type	Request type 9.9.4.14	M	V	1/2
	PDN type	PDN type 9.9.4.10	M	V	1/2
D-	ESM information transfer flag	ESM information transfer flag 9.9.4.5	O	TV	1
28	Access point name	Access point name 9.9.4.1	O	TLV	3-102
27	Protocol configuration options	Protocol configuration options 9.9.4.11	O	TLV	3-253
C-	Device properties	Device properties 9.9.2.0A	O	TV	1
33	NBIFOM container	NBIFOM container 9.9.4.19	O	TLV	3-257
66	Header compression configuration	Header compression configuration 9.9.4.22	O	TLV	5-257
7B	Extended protocol configuration options	Extended protocol configuration options 9.9.4.26	O	TLV-E	4-65538
3GPP TS 24.301 v15.03					
17. The method of claim 1, wherein the device service state comprises an agent report, a service usage record, a transaction record, or an integrity report.		The Accused Instrumentalities comprise receiving, over a service control link, a report from a wireless end-user device, the report comprising information about a device service state, wherein the device service state comprises an agent report, a service usage record, a transaction record, or an integrity report. <i>See, e.g.:</i>			

Table 8.2.4.1: ATTACH REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 9.2	M	V	1/2
	Security header type	Security header type 9.3.1	M	V	1/2
	Attach request message identity	Message type 9.8	M	V	1
	EPS attach type	EPS attach type 9.9.3.11	M	V	1/2
	NAS key set identifier	NAS key set identifier 9.9.3.21	M	V	1/2
	EPS mobile identity	EPS mobile identity 9.9.3.12	M	LV	5-12
	UE network capability	UE network capability 9.9.3.34	M	LV	3-14
	ESM message container	ESM message container 9.9.3.15	M	LV-E	5-n
19	Old P-TMSI signature	P-TMSI signature 9.9.3.26	O	TV	4
50	Additional GUTI	EPS mobile identity 9.9.3.12	O	TLV	13
52	Last visited registered TAI	Tracking area identity 9.9.3.32	O	TV	6
5C	DRX parameter	DRX parameter 9.9.3.8	O	TV	3
31	MS network capability	MS network capability 9.9.3.20	O	TLV	4-10
13	Old location area identification	Location area identification 9.9.2.2	O	TV	6
9-	TMSI status	TMSI status 9.9.3.31	O	TV	1
11	Mobile station classmark 2	Mobile station classmark 2 9.9.2.4	O	TLV	5
20	Mobile station classmark 3	Mobile station classmark 3 9.9.2.5	O	TLV	2-34
40	Supported Codecs	Supported Codec List 9.9.2.10	O	TLV	5-n
F-	Additional update type	Additional update type 9.9.3.0B	O	TV	1
5D	Voice domain preference and UE's usage setting	Voice domain preference and UE's usage setting 9.9.3.44	O	TLV	3
D-	Device properties	Device properties 9.9.2.0A	O	TV	1
E-	Old GUTI type	GUTI type 9.9.3.45	O	TV	1
C-	MS network feature support	MS network feature support 9.9.3.20A	O	TV	1
10	TMSI based NRI container	Network resource identifier container 9.9.3.24A	O	TLV	4
6A	T3324 value	GPRS timer 2 9.9.3.16A	O	TLV	3
5E	T3412 extended value	GPRS timer 3 9.9.3.16B	O	TLV	3
6E	Extended DRX parameters	Extended DRX parameters 9.9.3.46	O	TLV	3
6F	UE additional security capability	UE additional security capability 9.9.3.53	O	TLV	6
6D	UE status	UE status 9.9.3.54	O	TLV	3
17	Additional information requested	Additional information requested 9.9.3.55	O	TV	2

Table 8.3.8.1: BEARER RESOURCE ALLOCATION REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 9.2	M	V	1/2
	EPS bearer identity	EPS bearer identity 9.3.2	M	V	1/2
	Procedure transaction identity	Procedure transaction identity 9.4	M	V	1
	Bearer resource allocation request message identity	Message type 9.8	M	V	1
	Linked EPS bearer identity	Linked EPS bearer identity 9.9.4.6	M	V	1/2
	Spare half octet	Spare half octet 9.9.2.9	M	V	1/2
	Traffic flow aggregate	Traffic flow aggregate description 9.9.4.15	M	LV	2-256
	Required traffic flow QoS	EPS quality of service 9.9.4.3	M	LV	2-14
27	Protocol configuration options	Protocol configuration options 9.9.4.11	O	TLV	3-253
C-	Device properties	Device properties 9.9.2.0A	O	TV	1
33	NBIFOM container	NBIFOM container 9.9.4.19	O	TLV	3-257
7B	Extended protocol configuration options	Extended protocol configuration options 9.9.4.26	O	TLV-E	4-65538
5C	Extended EPS QoS	Extended quality of service 9.9.4.30	O	TLV	12

Table 8.3.10.1: BEARER RESOURCE MODIFICATION REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 9.2	M	V	1/2
	EPS bearer identity	EPS bearer identity 9.3.2	M	V	1/2
	Procedure transaction identity	Procedure transaction identity 9.4	M	V	1
	Bearer resource modification request message identity	Message type 9.8	M	V	1
	EPS bearer identity for packet filter	Linked EPS bearer identity 9.9.4.6	M	V	1/2
	Spare half octet	Spare half octet 9.9.2.9	M	V	1/2
	Traffic flow aggregate	Traffic flow aggregate description 9.9.4.15	M	LV	2-256
5B	Required traffic flow QoS	EPS quality of service 9.9.4.3	O	TLV	3-15
58	ESM cause	ESM cause 9.9.4.4	O	TV	2
27	Protocol configuration options	Protocol configuration options 9.9.4.11	O	TLV	3-253
C-	Device properties	Device properties 9.9.2.0A	O	TV	1
33	NBIFOM container	NBIFOM container 9.9.4.19	O	TLV	3-257
66	Header compression configuration	Header compression configuration 9.9.4.22	O	TLV	5-257
7B	Extended protocol configuration options	Extended protocol configuration options 9.9.4.26	O	TLV-E	4-65538
5C	Extended EPS QoS	Extended quality of service 9.9.4.30	O	TLV	12

	Table 8.3.20.1: PDN CONNECTIVITY REQUEST message content					
	IEI	Information Element	Type/Reference	Presence	Format	Length
		Protocol discriminator 9.2	Protocol discriminator	M	V	1/2
		EPS bearer identity 9.3.2	EPS bearer identity	M	V	1/2
		Procedure transaction identity 9.4	Procedure transaction identity	M	V	1
		PDN connectivity request message identity 9.8	Message type	M	V	1
		Request type 9.9.4.14	Request type	M	V	1/2
		PDN type 9.9.4.10	PDN type	M	V	1/2
	D-	ESM information transfer flag 9.9.4.5	ESM information transfer flag	O	TV	1
	28	Access point name 9.9.4.1	Access point name	O	TLV	3-102
	27	Protocol configuration options 9.9.4.11	Protocol configuration options	O	TLV	3-253
	C-	Device properties 9.9.2.0A	Device properties	O	TV	1
	33	NBIFOM container 9.9.4.19	NBIFOM container	O	TLV	3-257
	66	Header compression configuration 9.9.4.22	Header compression configuration	O	TLV	5-257
	7B	Extended protocol configuration options 9.9.4.26	Extended protocol configuration options	O	TLV-E	4-65538
3GPP TS 24.301 v15.03						
18. The method of claim 1, wherein the device service state comprises user status information, device status information, application status information, a device location, or a device quality-of-service (QOS) state.	The Accused Instrumentalities comprise receiving, over a service control link, a report from a wireless end-user device, the report comprising information about a device service state, wherein the device service state comprises user status information, device status information, application status information, a device location, or a device quality-of-service (QOS) state. <i>See, e.g.:</i>					

Table 8.2.4.1: ATTACH REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 9.2	M	V	1/2
	Security header type	Security header type 9.3.1	M	V	1/2
	Attach request message identity	Message type 9.8	M	V	1
	EPS attach type	EPS attach type 9.3.11	M	V	1/2
	NAS key set identifier	NAS key set identifier 9.3.21	M	V	1/2
	EPS mobile identity	EPS mobile identity 9.3.12	M	LV	5-12
	UE network capability	UE network capability 9.3.34	M	LV	3-14
	ESM message container	ESM message container 9.3.15	M	LV-E	5-n
19	Old P-TMSI signature	P-TMSI signature 9.3.26	O	TV	4
50	Additional GUTI	EPS mobile identity 9.3.12	O	TLV	13
52	Last visited registered TAI	Tracking area identity 9.3.32	O	TV	6
5C	DRX parameter	DRX parameter 9.3.8	O	TV	3
31	MS network capability	MS network capability 9.3.20	O	TLV	4-10
13	Old location area identification	Location area identification 9.2.2	O	TV	6
9-	TMSI status	TMSI status 9.3.31	O	TV	1
11	Mobile station classmark 2	Mobile station classmark 2 9.2.4	O	TLV	5
20	Mobile station classmark 3	Mobile station classmark 3 9.2.5	O	TLV	2-34
40	Supported Codecs	Supported Codec List 9.2.10	O	TLV	5-n
F-	Additional update type	Additional update type 9.3.0B	O	TV	1
5D	Voice domain preference and UE's usage setting	Voice domain preference and UE's usage setting 9.3.44	O	TLV	3
D-	Device properties	Device properties 9.2.0A	O	TV	1
E-	Old GUTI type	GUTI type 9.3.45	O	TV	1
C-	MS network feature support	MS network feature support 9.3.20A	O	TV	1
10	TMSI based NRI container	Network resource identifier container 9.3.24A	O	TLV	4
6A	T3324 value	GPRS timer 2 9.3.16A	O	TLV	3
5E	T3412 extended value	GPRS timer 3 9.3.16B	O	TLV	3
6E	Extended DRX parameters	Extended DRX parameters 9.3.46	O	TLV	3
6F	UE additional security capability	UE additional security capability 9.3.53	O	TLV	6
6D	UE status	UE status 9.3.54	O	TLV	3
17	Additional information requested	Additional information requested 9.3.55	O	TV	2

Table 8.3.8.1: BEARER RESOURCE ALLOCATION REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 9.2	M	V	1/2
	EPS bearer identity	EPS bearer identity 9.3.2	M	V	1/2
	Procedure transaction identity	Procedure transaction identity 9.4	M	V	1
	Bearer resource allocation request message identity	Message type 9.8	M	V	1
	Linked EPS bearer identity	Linked EPS bearer identity 9.3.46	M	V	1/2
	Spare half octet	Spare half octet 9.2.9	M	V	1/2
	Traffic flow aggregate	Traffic flow aggregate description 9.4.15	M	LV	2-256
	Required traffic flow QoS	EPS quality of service 9.4.3	M	LV	2-14
27	Protocol configuration options	Protocol configuration options 9.4.11	O	TLV	3-253
C-	Device properties	Device properties 9.2.0A	O	TV	1
33	NBIFOM container	NBIFOM container 9.4.19	O	TLV	3-257
7B	Extended protocol configuration options	Extended protocol configuration options 9.4.26	O	TLV-E	4-65538
5C	Extended EPS QoS	Extended quality of service 9.4.30	O	TLV	12

Table 8.3.10.1: BEARER RESOURCE MODIFICATION REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 9.2	M	V	1/2
	EPS bearer identity	EPS bearer identity 9.3.2	M	V	1/2
	Procedure transaction identity	Procedure transaction identity 9.4	M	V	1
	Bearer resource modification request message identity	Message type 9.8	M	V	1
	EPS bearer identity for packet filter	Linked EPS bearer identity 9.9.4.6	M	V	1/2
	Spare half octet	Spare half octet 9.9.2.9	M	V	1/2
	Traffic flow aggregate	Traffic flow aggregate description 9.9.4.15	M	LV	2-256
5B	Required traffic flow QoS	EPS quality of service 9.9.4.3	O	TLV	3-15
58	ESM cause	ESM cause 9.9.4.4	O	TV	2
27	Protocol configuration options	Protocol configuration options 9.9.4.11	O	TLV	3-253
C-	Device properties	Device properties 9.9.2.0A	O	TV	1
33	NBIFOM container	NBIFOM container 9.9.4.19	O	TLV	3-257
66	Header compression configuration	Header compression configuration 9.9.4.22	O	TLV	5-257
7B	Extended protocol configuration options	Extended protocol configuration options 9.9.4.26	O	TLV-E	4-65538
5C	Extended EPS QoS	Extended quality of service 9.9.4.30	O	TLV	12

Table 8.3.20.1: PDN CONNECTIVITY REQUEST message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator 9.2	M	V	1/2
	EPS bearer identity	EPS bearer identity 9.3.2	M	V	1/2
	Procedure transaction identity	Procedure transaction identity 9.4	M	V	1
	PDN connectivity request message identity	Message type 9.8	M	V	1
	Request type	Request type 9.9.4.14	M	V	1/2
	PDN type	PDN type 9.9.4.10	M	V	1/2
0-	ESM information transfer flag	ESM information transfer flag 9.9.4.5	O	TV	1
28	Access point name	Access point name 9.9.4.1	O	TLV	3-102
27	Protocol configuration options	Protocol configuration options 9.9.4.11	O	TLV	3-253
C-	Device properties	Device properties 9.9.2.0A	O	TV	1
33	NBIFOM container	NBIFOM container 9.9.4.19	O	TLV	3-257
66	Header compression configuration	Header compression configuration 9.9.4.22	O	TLV	5-257
7B	Extended protocol configuration options	Extended protocol configuration options 9.9.4.26	O	TLV-E	4-65538

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