

# Modem IPA Configuration Manager

## User Guide

80-NC254-64 Rev. D

January 2, 2020

Qualcomm  
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2022-07-29 05:09:13 GMT  
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# Revision history

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Revision	Date	Description
A	August 2013	Initial release
B	August 2014	Updated to include port and configuration information applicable to the MDM9x35 chipset
C	July 2015	Updated to include WAN, LAN, and WLAN Interface mode information applicable to the MDM9x45 chipset.
D	January 2020	Document restructured with editorial changes; to be read in its entirety

# Contents

---

Revision history ..... 2

1 Introduction IP packet accelerator configuration manager ..... 5

    1.1 Conventions ..... 5

    1.2 Technical assistance ..... 5

2 Configure IPACM for modems ..... 6

    2.1 Configure network properties using the IPACM XML file ..... 6

    2.2 Configure the interface to monitor the IPACM ..... 7

    2.3 Configure the IPACM private subnet ..... 9

    2.4 Configure the list of IPACM ALG ports ..... 10

    2.5 Configure IPACM NAT ..... 10

    2.6 Configure properties for ODU using the IPACM XML file ..... 11

        2.6.1 Configure subnet entry schema ..... 11

    2.7 IPACM\_cfg.xml example ..... 11

A References ..... 15

    A.1 Acronyms and terms ..... 15

# Figures

---

Figure 2-1: IPACM XML hierarchy structure..... 7

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# 1 Introduction IP packet accelerator configuration manager

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This document describes how to use and configure IP packet accelerator configuration manager (IPACM) routing, filtering, and network address translation (NAT) properties on modems.

## 1.1 Conventions

Function declarations, function names, type declarations, attributes, and code samples appear in a different font, for example, `cp armcc armcpp`.

Code variables appear in angle brackets, for example, `<number>`.

Commands to be entered appear in a different font, for example, `copy a:*. * b:.`

Button and key names appear in bold font, for example, click **Save** or press **Enter**.

## 1.2 Technical assistance

For assistance or clarification on information in this document, submit a case to Qualcomm Technologies, Inc. (QTI) at <https://createpoint.qti.qualcomm.com/>.

If you do not have access to the CDMATech Support website, register for access or send email to [support.cdmatech@qti.qualcomm.com](mailto:support.cdmatech@qti.qualcomm.com).

## 2 Configure IPACM for modems

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The IPACM tool automatically configures the routing, filtering, and NATing rules for each active interface, including IPACM clients in the Internet protocol accelerator (IPA) hardware. If the IPACM is in Daemon mode during device bootup, it listens to multiple netlink or conntrack events from the Linux kernel and configures the IPA hardware. The IPACM configuration file is defined in XML format as IPACM\_cfg.xml under the root /etc folder on the device.

### 2.1 Configure network properties using the IPACM XML file

Use the <IPACM> tag to specify the IPACM configuration database schema. The IPACM tag contains subsections with configurations for the following:

- Monitored interfaces
- Private subnets

- ALG ports
- Max IPACM NAT entry

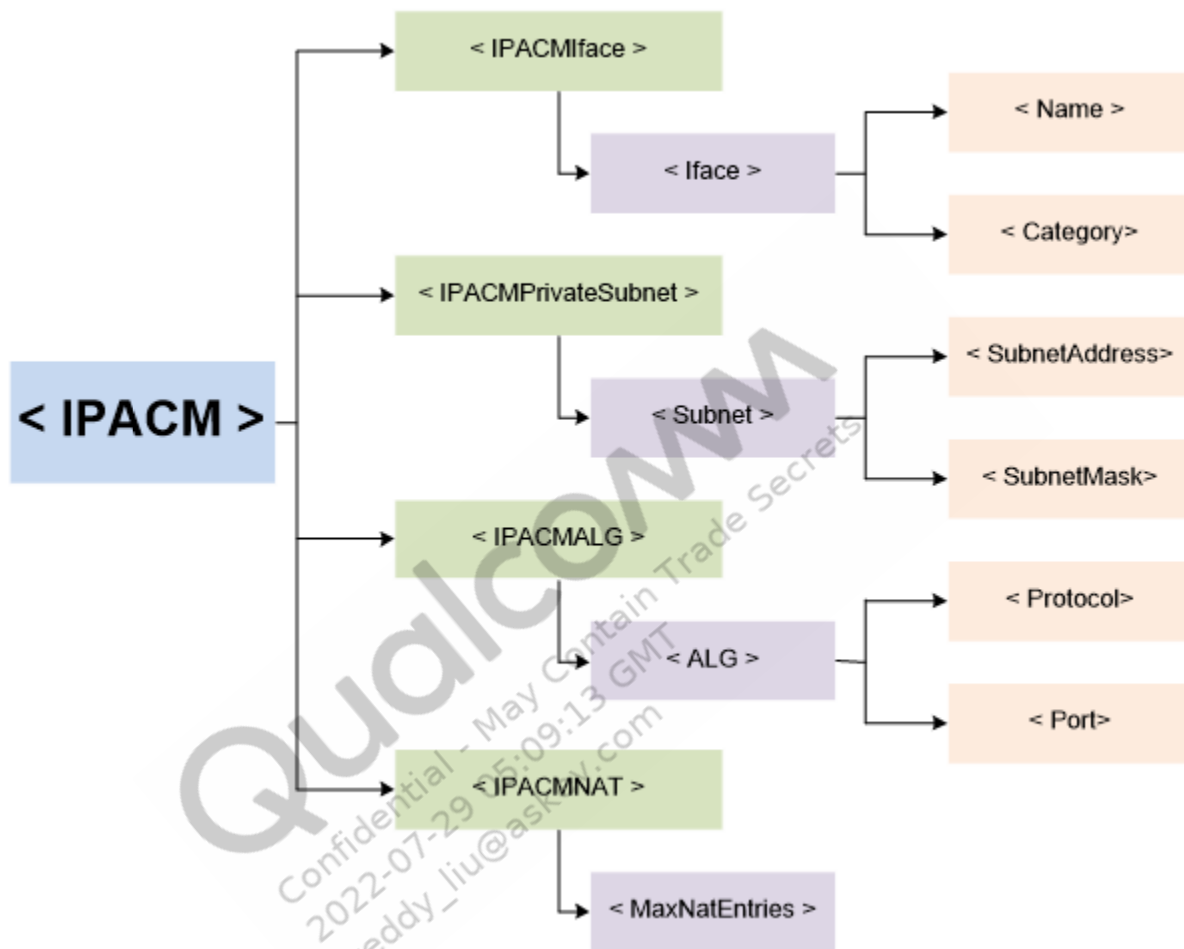


Figure 2-1 IPACM XML hierarchy structure

## 2.2 Configure the interface to monitor the IPACM

Use the <IPACMIface> to specify the monitored interface schema tag. The IPACMIface tag contains subsections with interface configurations.

### Configure interface entry schema

Use the <Iface> tag to specify each monitored interface entry schema. The Iface tag contains subsections to specify the interface name and category.

### Configure interface Name

Use the <Name> tag to specify the IPACM monitored interface name.

Tag format	<Name>[Interface name]</Name>
Valid values	An interface name shown in a string For example, wlan0
Default value	Not applicable – must be set to a valid entry

### Configure interface Category

Use the <Category> tag to specify the IPACM monitored interface category.

Tag format	<Category>[string]</Category>
Valid values	<ul style="list-style-type: none"> <li>■ LAN – works as LAN interface For example, USB</li> <li>■ WAN – works as WAN interface and has connection ability</li> <li>■ WLAN – works as WLAN interface</li> <li>■ UNKNOWN – works as either WLAN or WAN interface and waits until the WLAN driver sends an access-point (AP)-connect or a STA-connect message to the IPA driver</li> </ul> <p><b>Note:</b> When the interface is active, the WLAN driver sends a message to the IPA indicating whether the LAN interface, WLAN interface, or WAN interface works in AP mode (WLAN category) or STA mode (WAN category has Internet service available). For example, Wi-Fi backhaul.</p> <ul style="list-style-type: none"> <li>■ VIRTUAL – virtual bridge interface used for IP assignment</li> </ul>
Default value	Not applicable – must be set to a valid entry

### Configure Mode (optional)

Use the <Mode> tag to specify the mode in which the backhaul interface (modem or USB cradle backhaul) operates. The Mode tag is effective only for the WAN interface category.

If the Mode tag does not exist by default, the interface is set in Router mode. In Router mode, the device is assigned a public IP by a modem or an external router.

Bridge mode means that the device does not have a public IP; and it bridges to the modem or external router.

Tag format	<Mode>[string]</Mode>
Valid values	Router or Bridge
Default value	Router

### Configure WlanMode (optional)

Use the <WlanMode> tag to specify the access mode type the WLAN interface operates. The WlanMode tag is effective only when the interface is WLAN. For example, wlan0, wlan1, and so on. If the WlanMode tag does not exist by default, the WLAN interface is set to Full mode.



## Ful mode

The Wi-Fi client associated with the access point in Full mode has full access to the modem (public network) and other AP or USB clients.

## Internet mode

The Wi-Fi clients associated to the access point on Internet mode access only the modem (public network), but LAN traffic to other AP/USB clients is blocked.

Wi-Fi clients that are associated to the same access point always take the IPA-HW path in Internet and full mode.

Tag format	<WlanMode>[string]</WlanMode>
Valid values	Full or Internet
Default value	Full

**NOTE** Mode (optional) and WlanMode (optional) are applicable only to MDM9x45.

## 2.3 Configure the IPACM private subnet

Use the <IPACMPrivateSubnet> tag to specify the IPACM private subnet schema. The IPACMPrivateSubnet tag contains subsections with configurations for subnets used in the IPACM. There are three sets in MDM9x25, MDM9x35, and MDM9x45 MAX. Update IPA\_MAX\_PRIVATE\_SUBNET\_ENTRIES in the IPACM\_Def.h header file to configure more subnets.

**NOTE** The IPACMPrivateSubnet tag is applicable only to the MDM9x25, MDM9x35, and MDM9x45 chipsets.

### IPACM subnet entry schema

Use the <Subnet> tag to specify each IPACM configured subnet entry schema. The Subnet tag contains subsections to specify the subnet addresses and subnet masks.

#### Configure SubnetAddress

Use the SubnetAddress tag to specify the subnet IPv4 address.

Tag format	<SubnetAddress>[IP Address]</SubnetAddress>
Valid values	An IP address entered in dotted decimal format
Default value	Not applicable

#### Configure SubnetMask

Use the SubnetMask tag to specify the subnet IPv4 mask.

Tag format	<SubnetMask>[IP Address]</SubnetMask>
Valid values	An IP address entered in dotted decimal format
Default value	Not applicable

## 2.4 Configure the list of IPACM ALG ports

Use the <IPACMALG> to specify the IPACM ALG port schema tag. The IPACMALG tag contains subsections with configurations for monitored application level gateway (ALG) ports. The traffic on these monitored ALG ports is redirected to the Linux stack instead of the IPA hardware. The maximum number of ports the MDM9x25 chipset supports is 10. For the MDM9x35 and MDM9x45 chipsets, the maximum is 20. Update IPA\_MAX\_ALG\_ENTRIES in the IPACM\_Def.h header file to configure more ALG ports.

### Configure ALG entries

Use the <ALG> tag to specify each IPACM ALG entry schema. The ALG tag contains subsections to specify the ALG ports and protocols.

#### Configure Protocol

Use the <Protocol> tag to specify the ALG protocol.

Tag format	<Protocol>[string]</Protocol>
Valid values	<ul style="list-style-type: none"> <li>■ TCP – monitors TCP traffic on specific ALG port</li> <li>■ UDP – monitors UDP traffic on specific ALG port</li> </ul>
Default value	Not applicable – must be set to a valid entry

#### Configure Port

Use the <Port> tag to specify the ALG port.

Tag format	<Port>[Unsigned int]</Port>
Valid values	An integer from 0 to 65535
Default value	Not applicable – must be set to a valid entry

## 2.5 Configure IPACM NAT

Use the <IPACMNAT> tag to specify the IPACM NAT schema. The IPACMNAT tag contains maximum number of NAT entries.

### Configure MaxNatEntries

Use the <MaxNatEntries> tag to specify the maximum live NAT entries the IPACM can support.

Tag format	<MaxNatEntries>[Unsigned int]</MaxNatEntries>
Valid values	<p>An integer larger than 0</p> <p>For example, current use is 100 in MDM9x25 and 500 in MDM9x35 and MDM9x45.</p>
Default value	Not applicable – must be set to a valid entry

**NOTE** The IPA NAT inherently maintains an array to indicate which interface' clients should perform NATing and which should not. The IPACM verifies that the bringup interface has a valid Tx/Rx registration in the IPA hardware and puts Tx/Rx registration in a NAT array for IPA NAT. There is no need to specify non-NAT interfaces in the .xml file.

## 2.6 Configure properties for ODU using the IPACM XML file

QCMobileAP can modify the XML component entry dynamically. The IPACM applies the change passively.

<ODUCFG> is the ODU configuration database schema tag in the IPACM. The ODUCFG tag contains subsections with configurations for the following:

- Mode
- eMBMS traffic IPA offload

### 2.6.1 Configure subnet entry schema

Use the <Mode> tag to specify each ODUCFG configured subnet entry schema. The Mode tag contains subsections to specify the working mode of ODU configuration on the device.

#### Mode

Use the <Mode> tag to specify ODU mode.

Tag format	<Mode>[string]</Mode>
Valid values	Router or Bridge
Default value	Router

#### eMBMS\_offload

Use the <eMBMS\_offload> tag to specify whether the DL eMBMS traffic takes the IPA-HW path.

Tag format	<eMBMS_offload>[boolean]</eMBMS_offload>
Valid values	<ul style="list-style-type: none"> <li>▪ 1 – enable (IPA hardware path)</li> <li>▪ 0 – disable</li> </ul>
Default value	0

## 2.7 IPACM\_cfg.xml example

The following XML code is an example for IPACM configuration files:

```
<?xml version="1.0" encoding="UTF-8"?>
<system xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="ipacm_cfg.xsd">
  <ODUCFG>
    <OduMode>router</OduMode>
    <eMBMS_offload>0</eMBMS_offload>
  </ODUCFG>
  <IPACM>
    <IPACMIface>
      <Iface>
        <Name>rndis0</Name>
      </Iface>
    </IPACMIface>
  </IPACM>
</system>
```

```
<Category>LAN</Category>
</Iface>
<Iface>
  <Name>ecm0</Name>
  <Category>LAN</Category>
  <Mode>ROUTER</Mode>
</Iface>
<Iface>
  <Name>rmnet_data0</Name>
  <Category>WAN</Category>
</Iface>
<Iface>
  <Name>rmnet_data1</Name>
  <Category>WAN</Category>
</Iface>
<Iface>
  <Name>rmnet_data2</Name>
  <Category>WAN</Category>
</Iface>
<Iface>
  <Name>rmnet_data3</Name>
  <Category>WAN</Category>
</Iface>
<Iface>
  <Name>rmnet_data4</Name>
  <Category>WAN</Category>
</Iface>
<Iface>
  <Name>rmnet_data5</Name>
  <Category>WAN</Category>
</Iface>
<Iface>
  <Name>rmnet_data6</Name>
  <Category>WAN</Category>
</Iface>
<Iface>
  <Name>rmnet_data7</Name>
  <Category>WAN</Category>
</Iface>
<Iface>
  <Name>wlan0</Name>
  <Category>UNKNOWN</Category>
  <WlanMode>full</WlanMode>
</Iface>
<Iface>
  <Name>wlan1</Name>
  <Category>UNKNOWN</Category>
```

```
<WlanMode>internet</WlanMode>
</Iface>
<Iface>
  <Name>eth0</Name>
  <Category>ODU</Category>
</Iface>
<Iface>
  <Name>bridge0</Name>
  <Category>VIRTUAL</Category>
</Iface>
</IPACMIface>
<IPACMPPrivateSubnet>
  <Subnet>
    <SubnetAddress>192.168.225.0</SubnetAddress>
    <SubnetMask>255.255.255.0</SubnetMask>
  </Subnet>
</IPACMPPrivateSubnet>
<IPACMALG>
  <ALG>
    <Protocol>TCP</Protocol>
    <Port>21</Port>
    <Description>FTP</Description>
  </ALG>
  <ALG>
    <Protocol>TCP</Protocol>
    <Port>554</Port>
    <Description>RTSP</Description>
  </ALG>
  <ALG>
    <Protocol>TCP</Protocol>
    <Port>5060</Port>
    <Description>SIP</Description>
  </ALG>
  <ALG>
    <Protocol>UDP</Protocol>
    <Port>5060</Port>
    <Description>SIP</Description>
  </ALG>
  <ALG>
    <Protocol>TCP</Protocol>
    <Port>1723</Port>
    <Description>PPTP</Description>
  </ALG>
  <ALG>
    <Protocol>UDP</Protocol>
    <Port>69</Port>
    <Description>TFTP</Description>
  </ALG>
</IPACMALG>
```

```
</ALG>
<ALG>
  <Protocol>UDP</Protocol>
  <Port>53</Port>
  <Description>DNS</Description>
</ALG>
<ALG>
  <Protocol>TCP</Protocol>
  <Port>53</Port>
  <Description>DNS</Description>
</ALG>
<ALG>
  <Protocol>UDP</Protocol>
  <Port>10080</Port>
  <Description>AMANDA</Description>
</ALG>
<ALG>
  <Protocol>UDP</Protocol>
  <Port>1719</Port>
  <Description>H323</Description>
</ALG>
<ALG>
  <Protocol>TCP</Protocol>
  <Port>1720</Port>
  <Description>H323</Description>
</ALG>
<ALG>
  <Protocol>TCP</Protocol>
  <Port>6667</Port>
  <Description>IRC</Description>
</ALG>
<ALG>
  <Protocol>UDP</Protocol>
  <Port>137</Port>
  <Description>NETBIOS_NS</Description>
</ALG>
<ALG>
  <Protocol>TCP</Protocol>
  <Port>6566</Port>
  <Description>SANE</Description>
</ALG>
</IPACMALG>
<IPACMNAT>
  <MaxNatEntries>500</MaxNatEntries>
</IPACMNAT>
</IPACM>
</system>
```

# A References

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## A.1 Acronyms and terms

Acronym or term	Definition
ALG	Application level gateway
AP	Access point
IPACM	IP packet accelerator configuration manager (IPACM)
NAT	Network address translation
STA	Station mode