

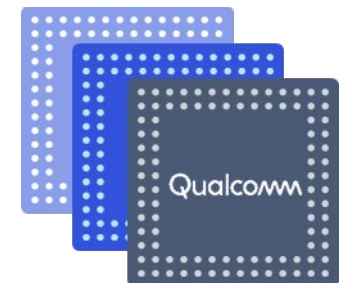
QCMobileAP VLAN-Multi PDN Support

80-PD082-33 Rev. C

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Revision History

Revision	Date	Description
A	June 2018	Initial release
B	March 2021	Added Slide 8
C	October 2021	Updated Slide 14

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High-Level Overview

- VLAN-multi packet data network (MPDN) – Provides multiple PDN connections on each LAN client as following:
 - Compose VLAN with multiple LAN clients
 - Map PDN connections to each VLAN
- VLAN configurations:
 - Maximum of one VLAN ID per bridge IFACE, including bridge0 (default bridge).
 - Each VLAN is in a separate subnet.
 - All non-VLAN or untagged traffic must be bridged to bridge0.
 - VLAN and default interface cannot be added simultaneously. For example, if eth0.2 is added to bridge0, then default eth0 is removed from bridge0.
 - Any changes in adding or removing VLAN interfaces to or from bridge0, triggers auto-reboot from softap.
 - WWAN IFACE is not allowed to have a VLAN IFACE
 - No VLAN exists on top of bridge interfaces
 - No VLAN is allowed on Wi-Fi
 - Client side (host) – VLAN IFACE must have a unique local address, global prefix address, and link local address.
 - Server side – (A7) VLAN IFACE must have a unique local address and link local address

High-Level Overview (cont.)

- VLAN-MPDN connection mapping:
 - One to one mapping between VLAN and packet data network (PDN)
 - VLAN-MPDN should involve bridge interface
 - VLAN-MPDN mapping change at runtime() is not supported
 - One time configuration
 - Requires reboot if configuration changes
 - VLAN to MPDN mapping is only for WWAN, not for STA or ETH or USB
- VLAN-Wi-Fi:
 - For access point (AP), AP mode, AP1, and AP2 are in default PDN.
 - Wi-Fi is always to be bridged to bridge0
 - Only one layer 2 tunneling protocol (L2TP) session per Wi-Fi AP.
 - For AP, AP scenario, legacy support for full access, or internet only are implied to be unaffected.
 - Does not allow separate Wi-Fi APs per PDN

High-Level Overview (cont.)

■ IPA VLAN

- For AP+STA router mode, if default bridge switches backhaul from WWAN to WLAN
 - IPA off-load is not supported.
 - Other on-demand bridges IPA offload are supported.
- No dynamic changing of VLAN offload selection during runtime.
- LAN↔LAN offload is only required for bridge0 IFACE, and exclusively VLAN or non-VLAN offload (default is for VLAN offload, if VLAN and non-VLAN IFACEs are bridged to bridge0).

■ VLAN-QCMAP – QCMAP triggers a force reboot in the following scenarios:

- When a VLAN (with IPA offload) is added on a phy for the first time.
- When the last VLAN (with IPA offload) is deleted on a phy.
- When a VLAN is added or removed to or from bridge0.

Note: When a VLAN is added to bridge0, then the default phy interface will not be added to bridge0.

- If the pkt stats is enabled and a VLAN is added.

■ Dependency with other features

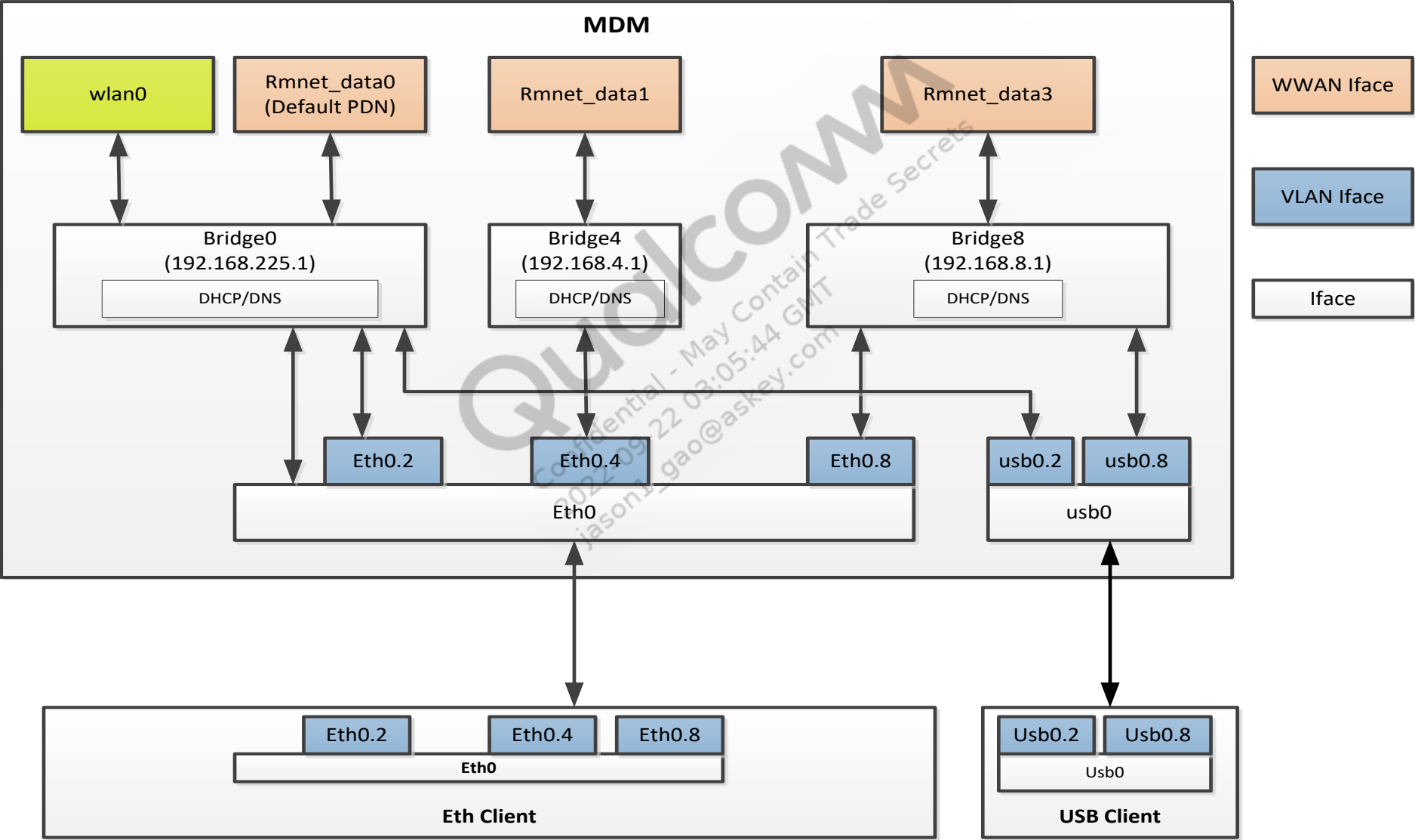
- If SOCKSv5 is enabled, then VLAN-MPDN mapping is not allowed.
- If a VLAN ID is coupled to L2TP, then VLAN-MPDN mapping is not allowed for that particular VLAN ID.
- Bonjour/mDNS/DLNA/UPNP is supported only for default PDN or bridge.

High-Level Overview (cont.)

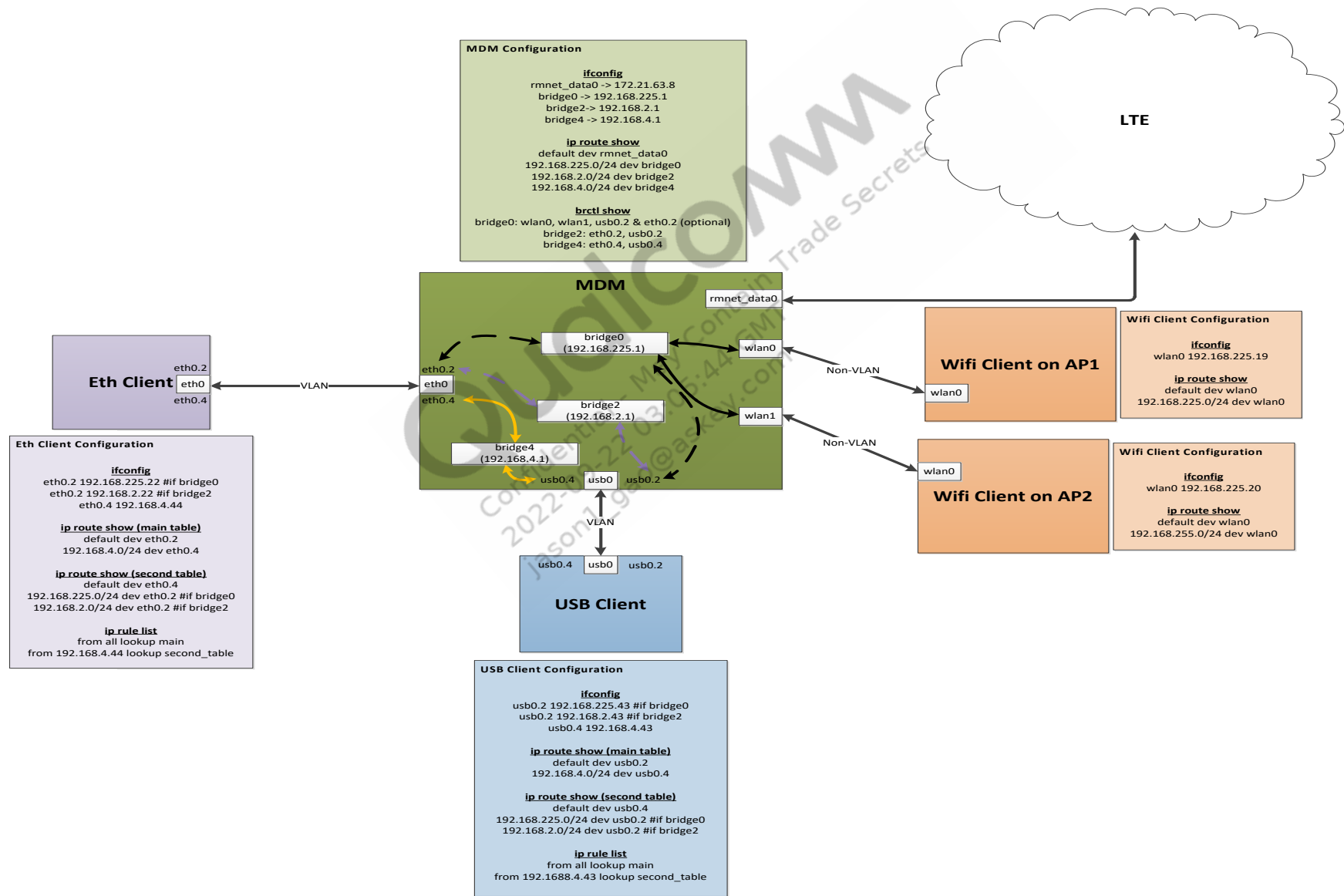
- MPDN-VLAN feature evolution on MBB chipsets.

MBB target/PL	VLAN-MPDN support	Number of VLAN-PDN mappings supported with IPA offload (Rest goes through software path)	IP passthrough support without NAT for single PDN and with IPA path	IP passthrough support without NAT for multi-PDN and with IPA path	IP passthrough support with NAT (on default PDN and without VLAN)	IP passthrough support with NAT and with VLAN
SDX24	Supports 1:1 mapping	3 VLAN to PDN	Not supported	Not supported	Supported (Legacy feature)	Not supported
SDX55.LE.1.0	Supports 1:1 mapping	3 VLAN to PDN	Not supported	Not supported	Supported (Legacy feature)	Not supported
SDX55.LE.1.1	Supports 1:1 mapping	4 VLAN to PDN	Not supported	Not supported	Supported (Legacy feature)	Not supported
SDX55.LE.1.2 (SDX55.LE.1.2-00009 or later)	Supports 1:1 mapping	4 VLAN to PDN	Supported	Not supported	Supported (Legacy feature)	Not supported
SDX55.LE.1.2 (SDX55.LE.1.2.r1-00018 or later)	Supports 1:1 mapping	8 VLAN to PDN (October' 20 CS release)	Supported	Supported (October' 20 CS release)	Supported (Legacy feature)	Supported (October' 20 CS release)

High-Level Architecture



Configuration Examples



Changes on APIs

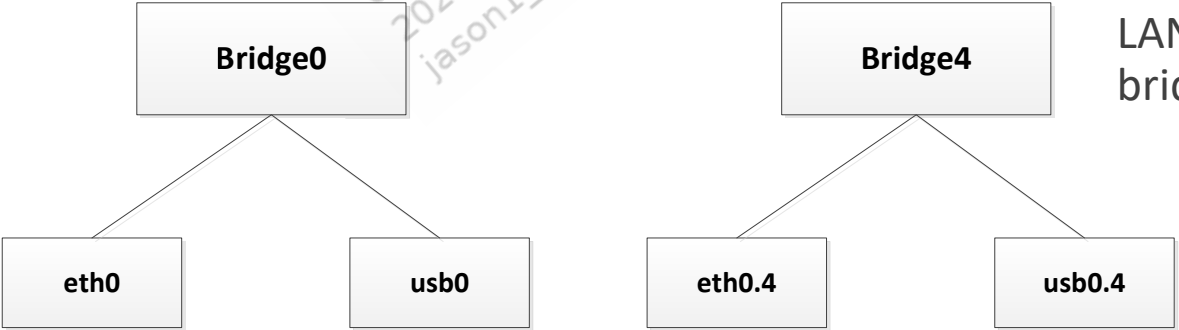
- QCMAP_API
 - Reuse the existing API. No new APIs from client point of view.
 - Client only needs to specify the ID to choose PDN connection or VLAN.
- QCMAP_CLI
 - Menu item changes
 - Affected menus
 - LAN configuration→Add VLAN interface
 - LAN configuration→Get VLAN interface
 - LAN configuration→Delete VLAN interface
 - Newly created Menus
 - LAN configuration→Set VLAN-Bridge context
 - WWAN configuration →Add/delete PDN to VLAN mapping

PDN Features

- Supported across all PDNs
 - Radish is on every bridge interface
 - L2TP, PPTP pass through per PDN.
 - NAT or ALG per PDN (NAT-type, DMZ, and port-forwarding)
 - SIP server per PDN
 - DNS service on each bridge interface; if not resolved, then query is sent to PDN associated to bridge interface.
 - DL or UL firewall per PDN
 - Deprecate prefix per PDN
 - CDI (single MAC address with multiple IPv4/v6 address use cases)
- Supported only on default PDN
 - Option to choose the preferred backhaul
 - IPv6 prefix delegation
 - DDNS
 - IP passthrough
 - Packet stats supported only for default LAN interface but not supported when VLAN is enabled

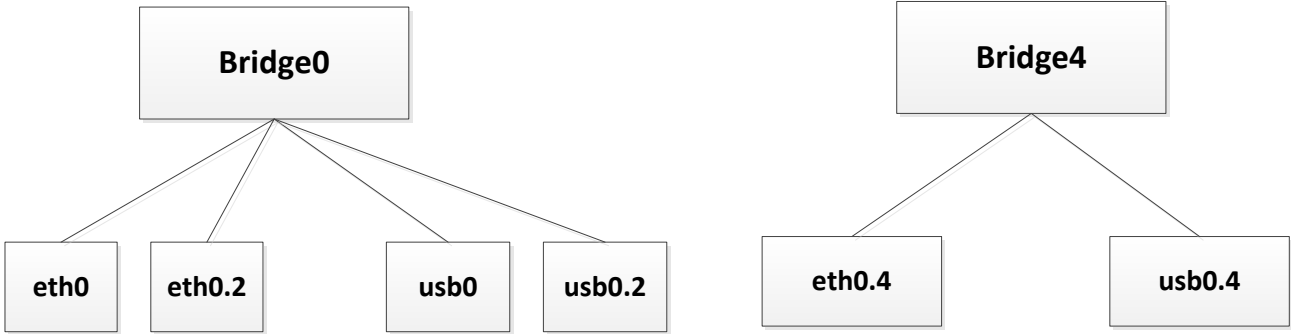
IPA Offload (If VLAN is not Enabled on ETH0, USB0 or Bridge0)

Hosts (From ↓, To →)	ETH client ETH0 (192.168.225.10)	ETH client ETH0.4 (192.168.4.10)	USB client USB0 (192.168.225.30)	USB client USB0.4 (192.168.4.20)	Wi-Fi client WLAN0 (192.168.225.43)
ETH client ETH0 (192.168.225.10)	Not valid use case	Does not go to IPA (Linux kernel this)	Yes	Does not go to IPA (Linux kernel handles this)	Yes
ETH client ETH0.4 (192.168.4.10)	Does not go to IPA (Linux kernel handles this)	Not valid use case	Does not go to IPA (Linux kernel handles this)	No offload required as of current	NA
USB client USB0 (192.168.225.30)	Yes	Does not go to IPA (Linux kernel handles this)	Not valid use case	Does not go to IPA (Linux kernel handles this)	Yes
USB client USB0.4 (192.168.4.20)	Does not go to IPA (Linux kernel handles this)	No offload required as of current	Does not go to IPA (Linux kernel handles this)	Not valid use case	NA



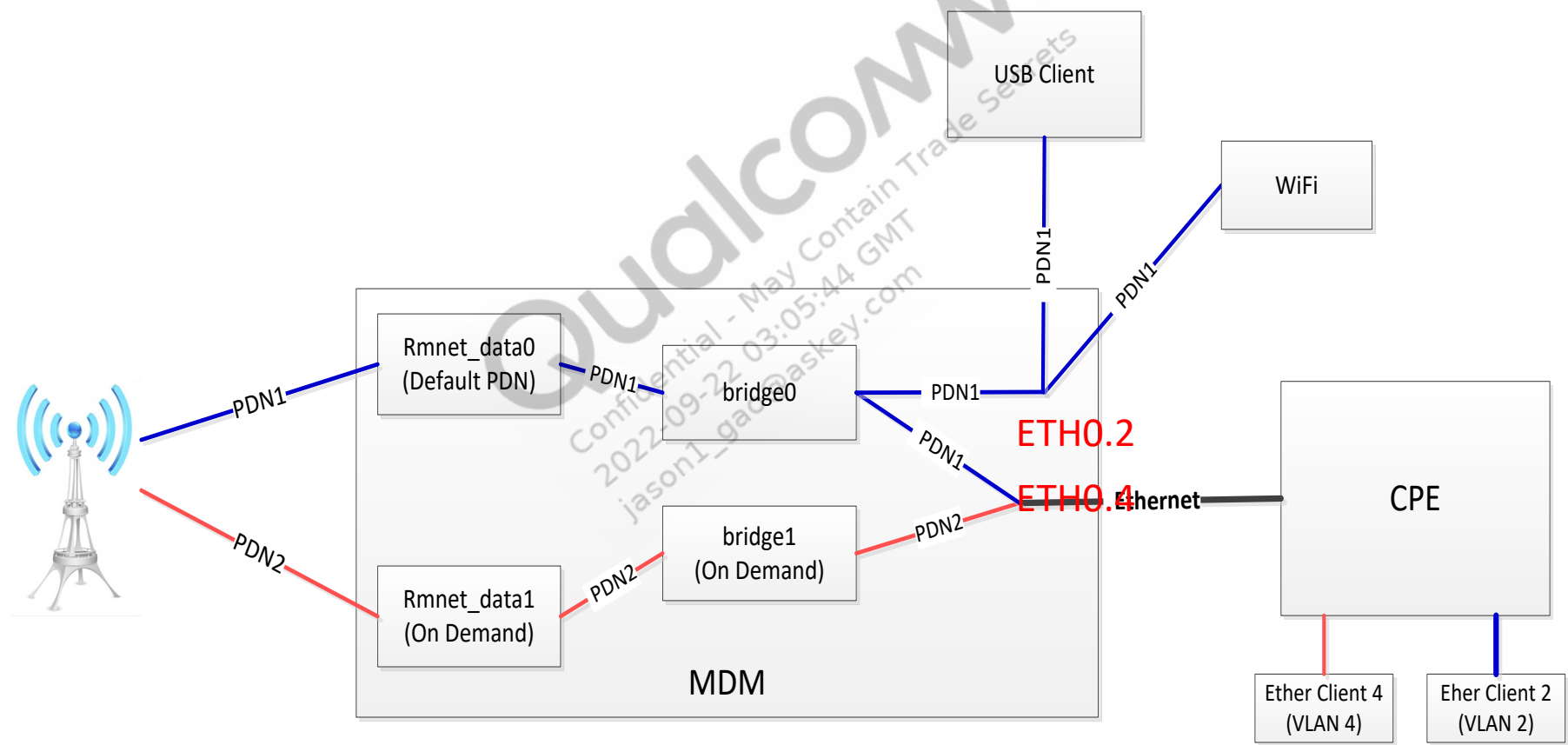
IPA Offload (If VLAN is Enabled on ETH0, USB0 or Bridge0)

Hosts (From ↓, To →)	ETH client ETH0 (192.168.225.10)	ETH client ETH0.2 (192.168.225.20)	ETH client ETH0.4 (192.168.4.10)	USB client USB0 (192.168.225.30)	USB client USB0.2 (192.168.225.40)	USB client USB0.4 (192.168.4.20)	Wi-Fi client WLAN0 (192.168.225.43)
ETH client ETH0 (192.168.225.10)	Not valid use case	No	Does not go to IPA Linux kernel handles this	No	No	Does not go to IPA Linux kernel handles this	No
ETH client ETH0.2 (192.168.225.20)	No	Not valid use case	Does not go to IPA Linux kernel handles this	No	Yes	Does not go to IPA Linux kernel handles this	No
ETH client ETH0.4 (192.168.4.10)	Does not go to IPA Linux kernel handles this	Does not go to IPA Linux kernel handles this	Not valid use case	Does not go to IPA Linux kernel handles this	Does not go to IPA Linux kernel handles this	No offload required as of current	NA
USB client USB0 (192.168.225.30)	No	No	Does not go to IPA Linux kernel handles this	Not valid use case	No	Does not go to IPA Linux kernel handles this	No
USB client USB0.2 (192.168.225.40)	No	Yes	Does not go to IPA Linux kernel handles this	No	Not valid use case	Does not go to IPA Linux kernel handles this	No
USB client USB0.4 (192.168.4.20)	Does not go to IPA Linux kernel handles this	Does not go to IPA Linux kernel handles this	No offload required as of current	Does not go to IPA Linux kernel handles this	Does not go to IPA Linux kernel handles this	Not valid use case	NA



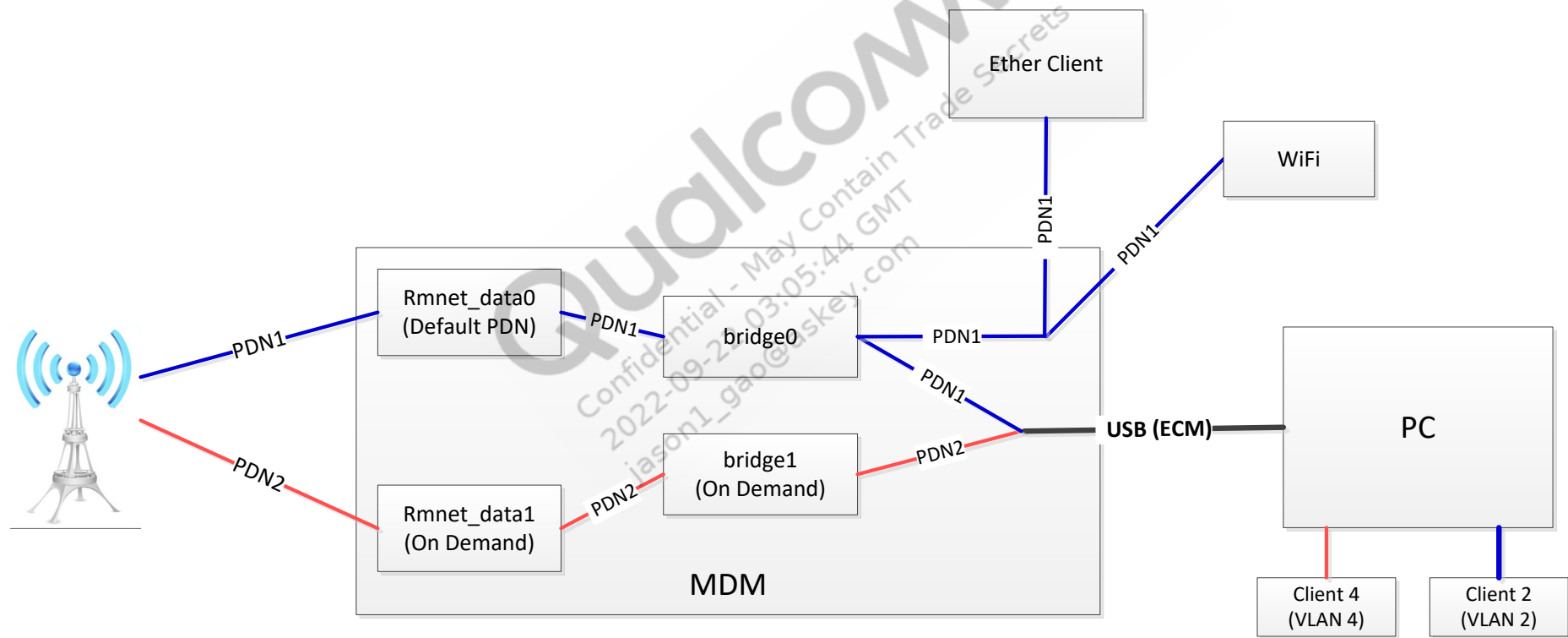
Sample VLAN Use Case 1 – Ethernet Data Path

PDN1 or PDN2 traffic is routed to Ethernet (ETH0.2 or ETH0.4) with a different VLAN ID.

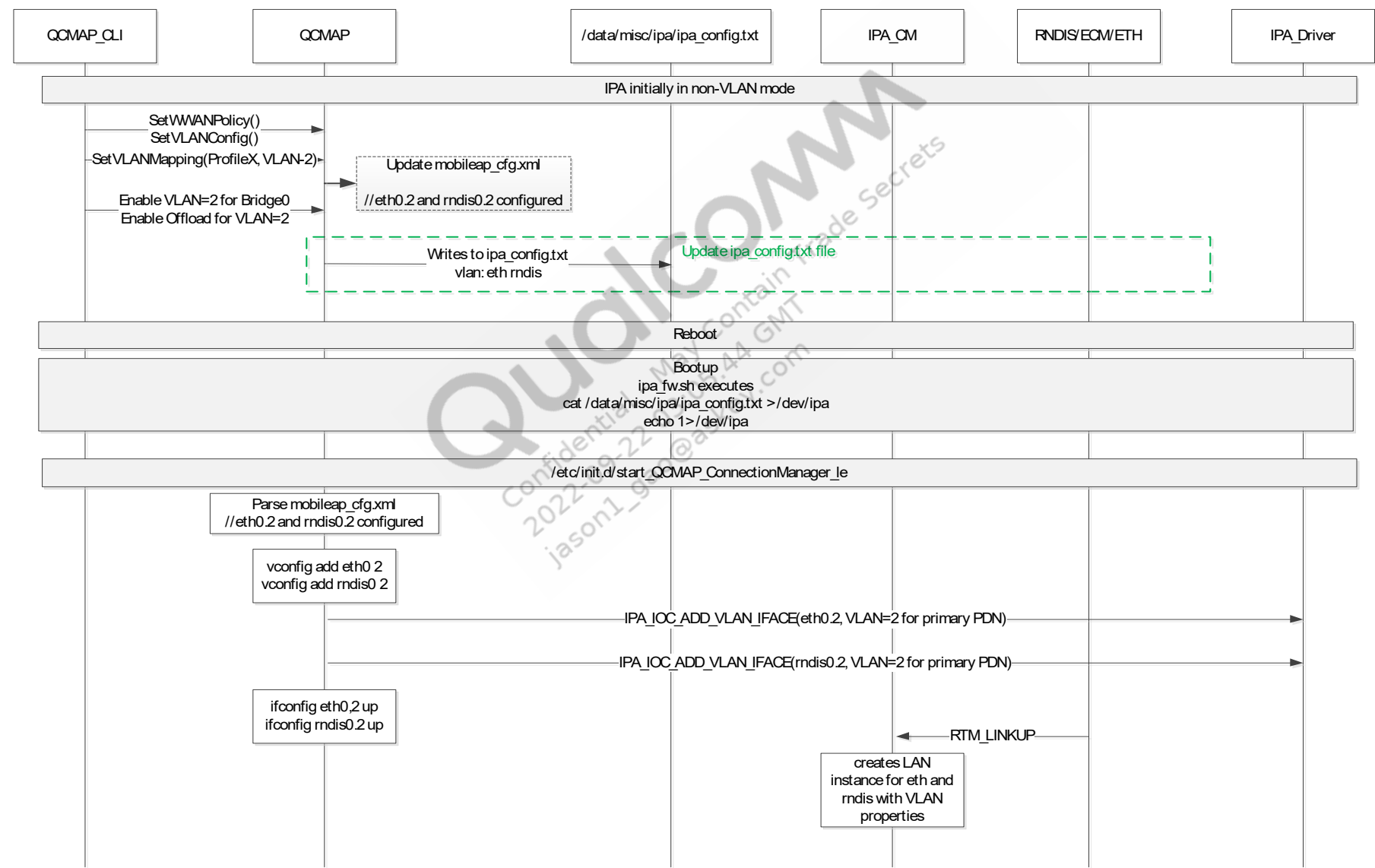


Sample VLAN Use Case 2 – USB Data Path

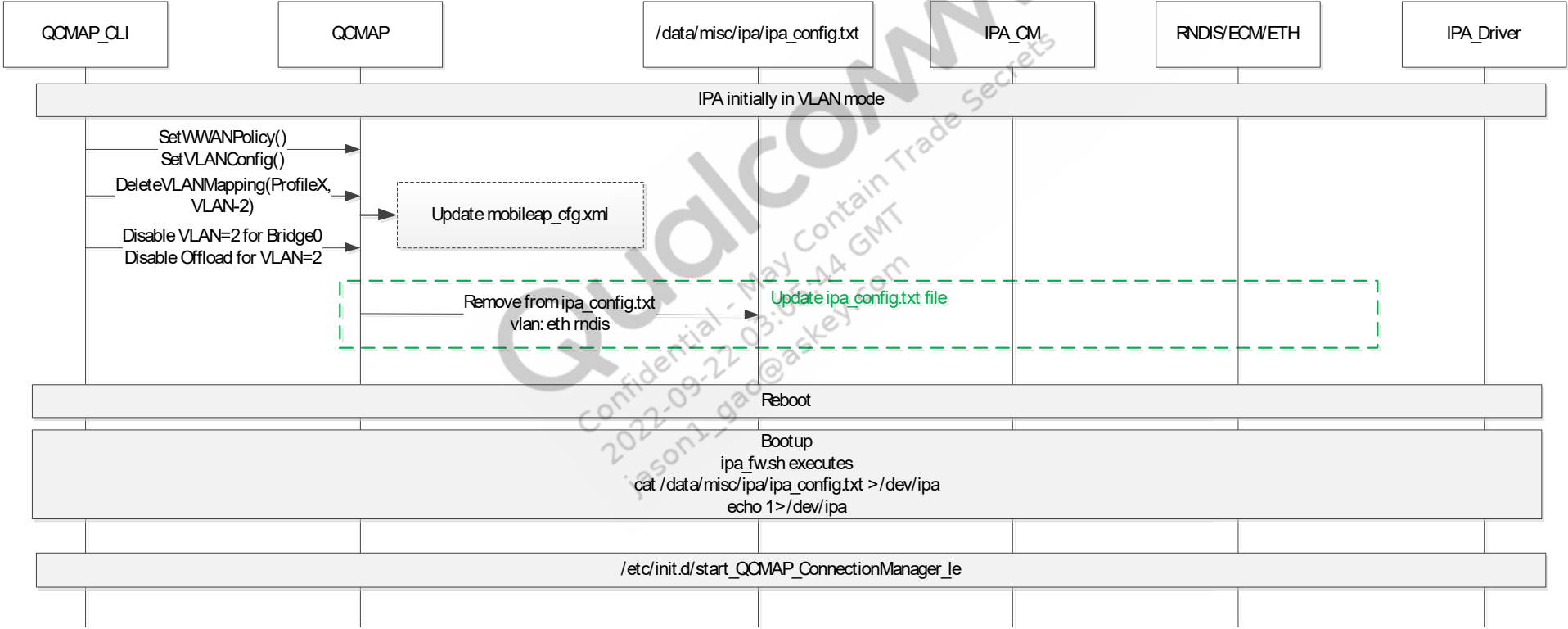
PDN1 or PDN2 traffic is routed to USB0 (USB0.2 or USB0.4) with different VLAN ID.



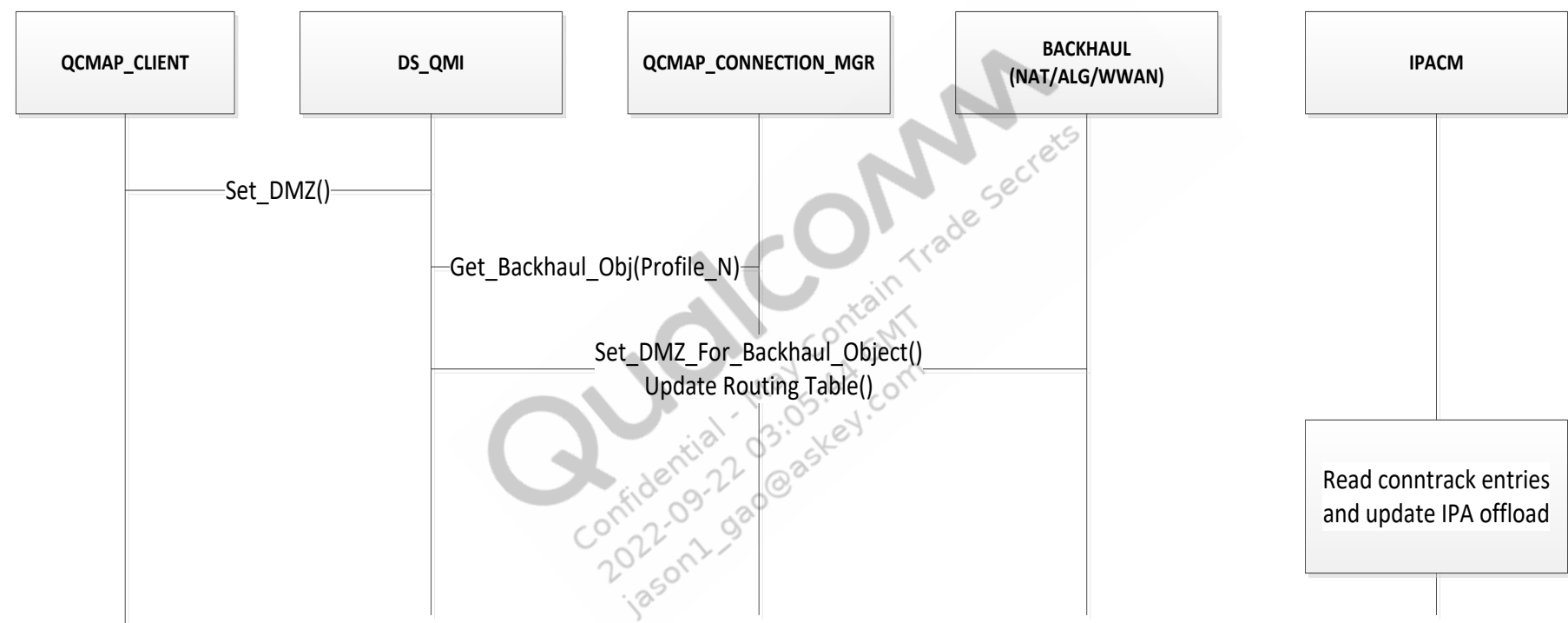
Call Flow – IPA Non-VLAN Mode→VLAN Mode



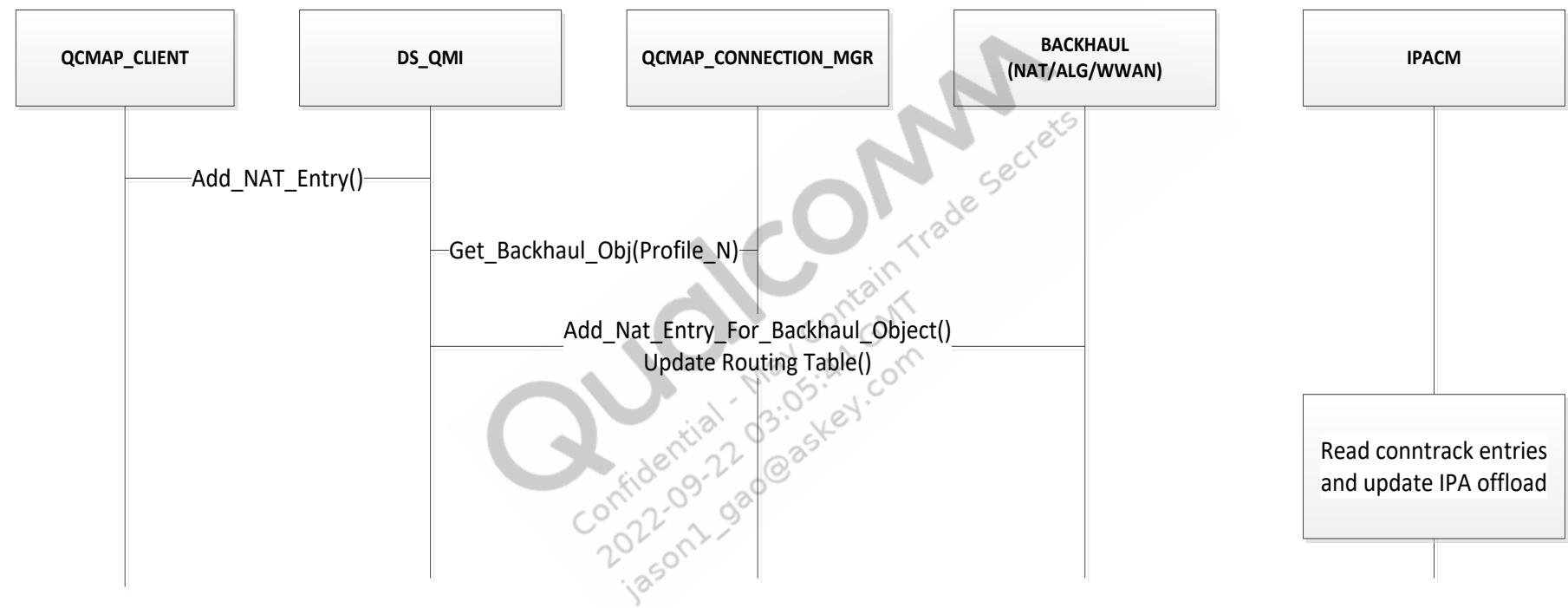
Call Flow – IPA VLAN Mode→Non-VLAN Mode



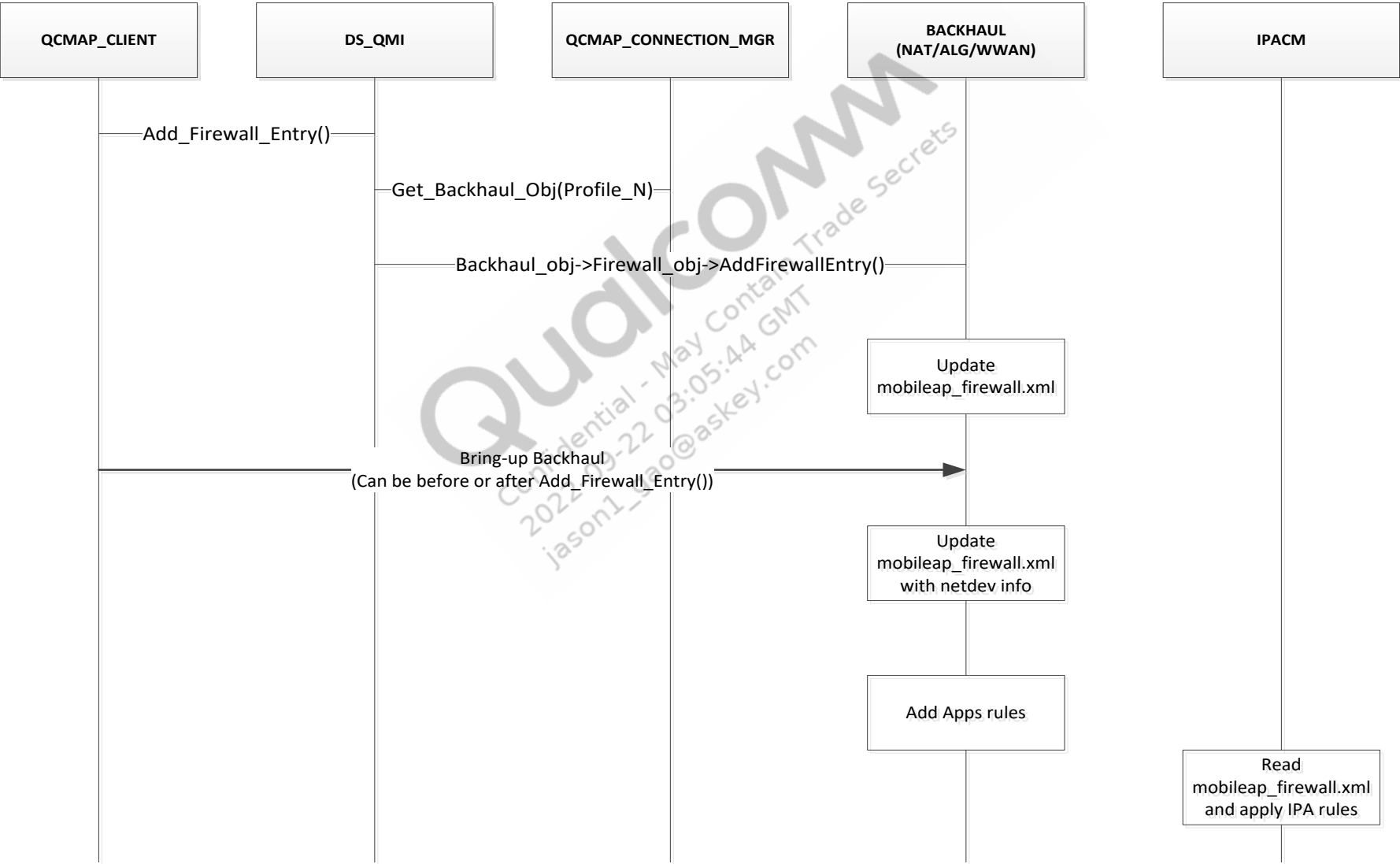
Add DMZ Call Flow for Secondary PDN



Add NAT Call Flow for Secondary PDN



VLAN to PDN Firewall



mobileap_cfg.xml New Configuration Changes

```
<ConcurrentMobileAPCfg>
  <Config>
    <MobileAPWanCfg>
      <Profile>2</Profile>
      <AutoConnect>0</AutoConnect>
      <Roaming>0</Roaming>
      <TECH>ANY</TECH>
      <V4_CDMA_PROFILE_INDEX>2</V4_CDMA_PROFILE_INDEX>
      <V4_UMTS_PROFILE_INDEX>2</V4_UMTS_PROFILE_INDEX>
      <V6_CDMA_PROFILE_INDEX>2</V6_CDMA_PROFILE_INDEX>
      <V6_UMTS_PROFILE_INDEX>2</V6_UMTS_PROFILE_INDEX>
    </MobileAPWanCfg>
    <MobileAPNatCfg>
      <DmzIP>0.0.0.0</DmzIP>
      <EnableIPSECVpnPassthrough>1</EnableIPSECVpnPassthrough>
      <EnablePPTPVpnPassthrough>1</EnablePPTPVpnPassthrough>
      <EnableL2TPVpnPassthrough>1</EnableL2TPVpnPassthrough>
      <NATType>SYM</NATType>
    </MobileAPNatCfg>
```

Note: If you are viewing this document using a color monitor, or if you print this document to a color printer, **red boldface** indicates code that is to be **added**.

mobileap_cfg.xml New Configuration Changes (cont.)

```
<BridgeCfg>
  <vlan_id>4</vlan_id>
  <APIPAddr>192.168.4.1</APIPAddr>
  <SubNetMask>255.255.255.0</SubNetMask>
  <EnableDHCPServer>1</EnableDHCPServer>
  <DHCPCfg>
    <StartIP>192.168.4.20</StartIP>
    <EndIP>192.168.4.60</EndIP>
    <LeaseTime>43200</LeaseTime>
  </DHCPCfg>
</BridgeCfg>
</Config>
</ConcurrentMobileAPCfg>
```

Note: If you are viewing this document using a color monitor, or if you print this document to a color printer, **red boldface** indicates code that is to be **added**.

mobileap_cfg.xml New Configuration Changes (cont.)

```
<vlan>
  <VConfig>
    <interface>eth0</interface>
    <id>8</id>
    <IPAOffLoad>1</IPAOffLoad>
  </VConfig>
  <VConfig>
    <interface>eth0</interface>
    <id>834</id>
    <IPAOffLoad>0</IPAOffLoad>
  </VConfig>
  <VConfig>
    <interface>ecm0</interface>
    <id>8</id>
    <IPAOffLoad>0</IPAOffLoad>
  </VConfig>
</vlan>
```

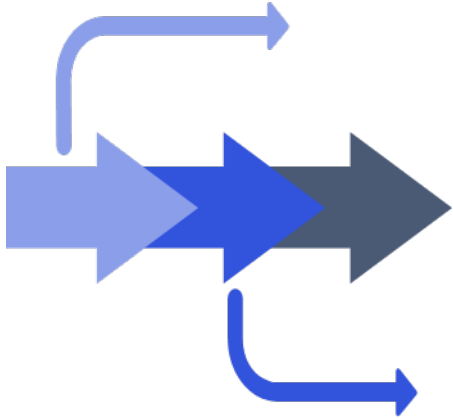
Note: If you are viewing this document using a color monitor, or if you print this document to a color printer, **red boldface** indicates code that is to be **added**.

Mobileap_firewall.xml Changes

```
<MobileAPFirewallCfg>
  <Profile>1</Profile>
    <NetDev>UNKNOWN</NetDev>
  <FirewallEnabled>0</FirewallEnabled>
  <FirewallPktsAllowed>0</FirewallPktsAllowed>
  <UPNPInboundPinhole>0</UPNPInboundPinhole>
  <Firewall>
    <FirewallHandle>1804289383</FirewallHandle>
    <PinholeEntry>0</PinholeEntry>
    <IPFamily>4</IPFamily>
    <IPV4SourceAddress>
      <IPV4SourceIPAddress>192.168.225.65</IPV4SourceIPAddress>
      <IPV4SourceSubnetMask>192.52.5.6</IPV4SourceSubnetMask>
    </IPV4SourceAddress>
    <IPV4NextHeaderProtocol>17</IPV4NextHeaderProtocol>
    <UDPSource>
      <UDPSourcePort>5005</UDPSourcePort>
      <UDPSourceRange>5</UDPSourceRange>
    </UDPSource>
  </Firewall>
  <Firewall>
    ....
  </Firewall>
</MobileAPFirewallCfg>
<MobileAPFirewallCfg>
  <Profile>2</Profile>
    <NetDev>UNKNOWN</NetDev>
  ...
</MobileAPFirewallCfg>
```

References

Acronyms	
Acronym or term	Definition
ALG	Aggregated local or global map
AP	Access point
DNS	Domain name server
DL	Downlink
DLNA	Digital living network alliance
DMZ	Demilitarized zone
IPA	IP accelerator
L2TP	Layer 2 tunneling protocol
MBB	Mobile broadband
MDNS	Multi cast DNS
MPDN	Multi packet data network
NAT	Network address translation
PPTP	Point-to-point tunneling protocol
QCMAP	Qualcomm mobile access point
SIP	Session initiation protocol
STA	Station
UL	Uplink
UPNP	Universal plug and play



Questions?

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