



Ethernet Subinterface

bintec Dm750-I

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Table of Contents

I	Related Documents	1
Chapter 1	Configuration	2
1.1	Creating the Ethernet subinterface	2
1.2	Deleting the Ethernet subinterface	2
1.3	Configuring the Ethernet subinterface	3
1.3.1	? (HELP)	3
1.3.2	CDP	4
1.3.3	ENCAPSULATION	4
1.3.4	LIST	6
1.3.5	LLC	6
1.3.6	LLDP	6
1.3.7	MAC-ADDRESS	6
1.3.8	NO	7
1.3.9	PORT-TAG	8
1.3.10	QOS-PRE-CLASSIFY	8
1.3.11	SWITCHPORT	9
1.3.12	EXIT	9
Chapter 2	Monitoring	10
2.1	Introduction	10
2.2	Ethernet subinterfaces and their monitoring command	10
2.3	Status of the Ethernet subinterface	10
2.4	Ethernet subinterface statistics	12

I Related Documents

bintec Dm702-I TCP-IP Configuration

bintec Dm709-I LAN Interfaces

bintec Dm751-I VLAN

bintec Dm772-I Common Configurations for Interfaces

bintec Dm805-I IPv6 Addressing

bintec Dm813-I LLDP Protocol

Chapter 1 Configuration

1.1 Creating the Ethernet subinterface

The Ethernet subinterface is created through the **add device** command found in the general configuration menu.

Syntax:

```
Config>add device eth-subinterface <Ethernet base interface> <subinterface number>
Config>
```

Example:

```
Config>add device eth-subinterface ethernet0/0 1
Config>
```

The subinterface number is between 1 and 10000. If the subinterface already exists, an error message appears.

Example:

```
Config>add device eth-subinterface ethernet0/0 1
CLI Error: Invalid interface Id
CLI Error: Command error
Config>
```

You can check if the subinterface has been created through the **list devices** command.

```
Config>list devices
Interface      Connector      Type of interface
ethernet0/0    LAN1           Fast Ethernet interface
serial0/0      SERIAL0/WAN1  X25
serial0/1      SERIAL1/WAN2  X25
serial0/2      SERIAL2/WAN3  X25
bri0/0         BRI/ISDN1     ISDN Basic Rate Int
x25-node       ---           Router->Node
ethernet0/0.1 ---           Ethernet subinterface
Config>
```

You can access a subinterface configuration menu through the **network** command found in the main configuration menu. To identify the subinterface, indicate the basic interface name followed by the subinterface number separated by a period.

Example:

Accessing the configuration menu for subinterface 1 associated with the ethernet0/0 base interface.

```
Config>network ethernet0/0.1

-- Ethernet Subinterface Configuration --
ethernet0/0.1 config>
```

Through the VLAN configuration (manual bintec Dm751-I), you can associate each switch port to a VLAN. Thus, the switch ports belonging to a VLAN whose label matches the dot1q label of the Ethernet subinterface are considered switch ports associated with the subinterface. The state of the subinterface depends on the state of the port link associated with said subinterface:

- (1) If none of the associated ports has a link, then the subinterface is down.
- (2) If some of the associated ports have a link, then the subinterface is active.

Whenever the subinterface does not have an associated port, its state is always active.

Through configuration, you can prevent the subinterface from tracking the status of a given associated port.

1.2 Deleting the Ethernet subinterface

To delete an Ethernet subinterface, use the **no device** command found in the general configuration menu, followed by the identifier of the subinterface you wish to delete.

Example:

```
Config>no device ethernet0/0.1
Config>
```

1.3 Configuring the Ethernet subinterface

You can access a subinterface configuration menu through the **network** command found in the main configuration menu. To identify the subinterface, indicate the basic interface name followed by the subinterface number separated by a period.

Example:

```
Config>network ethernet0/0.1

-- Ethernet Subinterface Configuration --
ethernet0/0.1 config>
```

The commands available in the Ethernet subinterface configuration menu are described in the following sections.

Certain commands are common to all interfaces. They are described in the manual that explains how to configure common interfaces (bintec Dm772-I Common Configurations for Interfaces).

The commands available in the Ethernet subinterface configuration menu are as follows:

Command	Function
? (HELP)	Displays available commands or their options.
ENCAPSULATION	Configures the type of subinterface MAC encapsulation.
LIST	Displays subinterface configuration.
LLC	Accesses LLC configuration.
MAC-ADDRESS	Adopts locally administered addresses.
NO	Negates a command or establishes the default value for a parameter.
PORT-TAG	Switches the port number associated with the subinterface.
QoS-PRE-CLASSIFY	Enables packet pre-filtering (for BRS).
SWITCHPORT	Switches the port excluded from the subinterface state.
EXIT	Exits the specific configuration menu for the Ethernet subinterface.

1.3.1 ? (HELP)

Displays the available commands or their options.

Syntax:

```
ethernetX/X.X config>?
```

Example:

```
ethernet0/0.1 config>?
 cdp                CDP interface subcommands
 description        Enter interface description
 encapsulation      Subinterface encapsulation
 ip                 Interface Internet Protocol config commands
 ipv6               Interface Internet Protocol version 6 config commands
 list               Displays the current configuration
 llc                Displays the LLC configuration prompt
 lldp               LLDP interface subcommands
 mac-address        Adopt locally administered addresses
 no                 Negate a command or set its defaults
 port-tag           Switch port number associated to the subinterface
 qos-pre-classify   QoS pre-classify
 shutdown           Change state to administratively down
 switchport         Switch port excluded from the subinterface state
 update             Update a level indicator
 exit
ethernet0/0.1 config>
```

1.3.2 CDP

Configures the CDP protocol in the interface.

1.3.3 ENCAPSULATION

Configures the encapsulation used by the Ethernet subinterface selected at the MAC level.

Syntax:

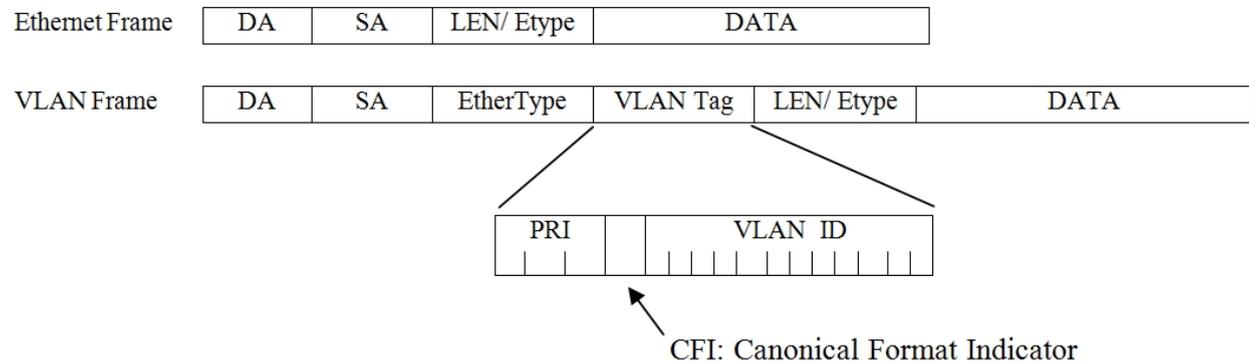
```
ethernetX/X.X config>encapsulation ?
  dot1q      VLAN IEEE 802.1Q support
```

Default is ARPA encapsulation.

When configuring encapsulation in the subinterface, there are three possibilities: using a simple tag (dot1Q), using a double one (QinQ) or using a simple tag that is automatically configured when an IPv6 Router Advertisement (RA) packet is received. For further information, please see manual bintec Dm805-I IPv6 Addressing.

1.3.3.1 ENCAPSULATION DOT1Q

Configures the subinterface so that it uses an encapsulation that matches the IEEE 802.1Q standard, allowing for Virtual LAN (VLAN) support. This encapsulation increases the size of the Ethernet frame MAC header by four bytes, two of which contain the VLAN information. For further information, please see manual bintec Dm751-I VLAN.



The EtherType field value is usually 0x8100, although there are other possibilities (such as 0x88A8, 0x9100 or 0x9200). For further information on configuration, please see manual bintec Dm709-I LAN Interfaces.

All frames sent to the Ethernet subinterface use this encapsulation with the configured Virtual LAN Identifier (*VID*). On reaching the base interface with the VLAN encapsulation, frames that have the *VID* and *EtherType* field configured in the interface will be sent to the Ethernet subinterface and processed there. Frames received whose *VID* does not correspond to any of the configured subinterfaces will be processed by the base interface.

Syntax:

```
ethernetX/X.X config>encapsulation dot1q <vlan ID>
```

The values of the VLAN identifier range from 1 to 4095. However, values 1 and 4095 are reserved for a particular use. The 802.1Q standard defines the following reserved values:

VID value	Meaning/Use
0	The null VLAN ID. Indicates the tag header contains only priority information; no VLAN identifier is present in the frame. This VID value is not configured as a PVID or a member of a VID set, or configured in any filtering database entry, or used in any management operation.
1	The default PVID value used to classify incoming frames through a bridge port. The PVID value of a port can be changed through management.
4095	Reserved for implementation use. This VID value is not configured as a PVID or a member of a VID Set, or transmitted in a tag header. Said VID value may be used to indicate a wildcard match for the VID in management operations or filtering database entries.



Note

We recommend not to use reserved values 1 and 4095 in the Ethernet subinterfaces. The results may not match your expectations.

Example:

```

ethernet0/0.1 config>encapsulation dot1q 10
ethernet0/0.1 config>

```

You cannot configure two subinterfaces over the same base interface with the same VLAN identifier. If you try to do this, an error message is displayed. To return to the default encapsulation (ARPA), use the **no encapsulation dot1q** command.

1.3.3.2 ENCAPSULATION DOT1Q <SP-vlan ID> SECOND-DOT1Q <CE-vlan ID>

Configures the subinterface so that it executes a double IEEE 802.1Q (QinQ) encapsulation. This means it adds 8 bytes to the MAC header (4 bytes per tag). This new tagging helps create new services and increases the range of VLANs that server clients can use (allowing, for instance, the same tag to be reused for different clients).

VLAN Inc. Frame:

DA	SA	EtherType	SP-VLAN Tag	0x8100	CE-VLAN Tag	LEN/ Etype	DATA
----	----	-----------	-------------	--------	-------------	------------	------

In this case, there are two VLAN identifiers: one linked to the service provider (*SP-VID*) and the other to the client (*CE-VID*). The *EtherType* field value corresponds to the server tag and can be configured. However, the client tag keeps its 0x8100 value. Just like with the simple tag, the frames sent to the Ethernet subinterface use this encapsulation with two configured VIDs. All frames reaching the base interface with double encapsulation (*VLAN QinQ*), together with the *VIDs* and *EtherType* value configured, are sent to the Ethernet subinterface to be processed. By contrast, those that don't comply with this are processed by the base interface.

Syntax:

```

ethernetX/X.X config>encapsulation dot1q <SP vlan ID> second-dot1q <CE vlan ID>

```

Example:

```

ethernet0/0.30 config>encapsulation dot1q 30 second-dot1q 200
ethernet0/0.30 config>

```

You cannot configure the two subinterfaces over the same base interface with the same combination of VLAN *SP-VID/CE-VID* identifiers. If you do, the device will display an error message. Use the **no encapsulation dot1q** command to return to the default encapsulation (ARPA).

**Note**

Executing encapsulation monopolizes the Ethernet frame and can cause MTU/fragmentation problems in some devices. To solve this problem, limit the IP MTU of subinterfaces by means of the IP MTU command. Further information on this can be found in manual bintec Dm702-I TCP-IP Configuration.

**Note**

If a frame reaches the base interface with double encapsulation (*VLAN QinQ*) and there is no Ethernet subinterface with the same *VIDs* configured, but there is a subinterface with a VLAN identifier (*VID*) that matches the external VLAN identifier of the frame (*SP-VID*), then the frame is sent to this Ethernet subinterface to be processed. This way, only the external VLAN identifier will be removed.

1.3.3.3 ENCAPSULATION DOT1Q RA-AUTO

Configures the subinterface so that it uses encapsulation in the same way as with the **encapsulation dot1q <vlan ID>** command. In this case, however, the value of the Virtual LAN Identifier is unknown at first and only takes a valid value when an IPv6 RA is received. For further information about IPv6 RA, please see manual bintec Dm805-I IPv6 Addressing.

When configuring a subinterface with RA-AUTO mode, if an IPv6 RA packet with VLAN encapsulation reaches the device and there is no other subinterface with the same VID, this packet is processed. If it ends up having a valid IPv6 prefix that allows the device to configure an IPv6 address on this subinterface, then the VID received is configured as the subinterface's final Virtual LAN Identifier.

Once the VID of the received RA is configured, the subinterface operates as described in the *ENCAPSULATION DOT1Q* section

Syntax:

```

ethernetX/X.X config>encapsulation dot1q ra-auto

```

Example:

```

ethernet0/0.20 config>encapsulation dot1q ra-auto
ethernet0/0.20 config>

```

To monitor the final VID configured on the subinterface, please use the **subifcs** monitoring command (found in the **network** monitoring menu of the base interface that belongs to this subinterface). For further information, please see manual bintec Dm709-I LAN Interfaces.

To return to the default encapsulation (ARPA), use the **no encapsulation dot1q** command.

Command history:

Release	Modification
11.01.03	The ra-auto option was introduced as of version 11.01.03.

1.3.4 LIST

Displays the Ethernet subinterface configuration.

Syntax:

```
ethernetX/X.X config>list
```

Example:

```

ethernet0/0.1 config>list
Encapsulation: IEEE 802.1Q
  VLAN ID: 10
Port-tag: 1
QoS preclassify: disabled
Excluded port : None

ethernet0/0.1 config>

```

1.3.5 LLC

Accesses the specific LLC configuration menu. You need this configuration to transmit frames over the SNA network. For further information on the available commands and how to use them, please see chapter 5 of the **bintec Dm709-I LAN Interfaces** manual.

1.3.6 LLDP

Configures the LLDP options in the interface. For further information on *Link Layer Discovery Protocol*, please see manual bintec Dm813-I LLDP Protocol.

1.3.7 MAC-ADDRESS

Configures the physical address (MAC) used in the subinterface. MAC addresses can be locally or universally managed (when provided by the device manufacturer). Enter a question mark (?) after the **hardware** command to obtain a listing of the available options.

```
ethernetX/X.X config>mac-address ?
```

```

ethernetX/X.X config>mac-address ?
 auto          Assign MAC automatically
 <mac>        MAC format

```

You can type the physical address in order to assign it to the subinterface. You can only configure locally administered addresses using this command.

Syntax:

```
ethernet0/0.1 config>mac-address <MAC address>
```

Example:

```

ethernet0/0.1 config>mac-address 0a-21-03-32-21-72
ethernet0/0.1 config>

```

1.3.7.1 AUTO

Configures an automatic physical address (MAC) used in the subinterface. Addresses provided by the device manufacturer (universally managed) are assigned first. When they run out, locally managed addresses are assigned.

Example:

```
ethernet0/0.1 config>mac-address auto
```

Command history:

Release	Modification
11.00.07	The auto command was introduced as of version 11.00.07.
11.01.02	The auto command was introduced as of version 11.01.02.

1.3.8 NO

Configures parameters to their default values, deactivates certain options or deletes configuration elements that were previously added .

Syntax:

```
ethernetX/X.X config>no ?
  description      Enter interface description
  encapsulation    Subinterface encapsulation
  ip               Interface Internet Protocol config commands
  mac-address      Adopt locally administered addresses
  qos-pre-classify QoS pre-classify
  port-tag         Switch port number associated to the subinterface
  shutdown         Change state to administratively down
  switchport       Switch port excluded from the subinterface state
  update           Update a level indicator
```

1.3.8.1 NO ENCAPSULATION

Allows the subinterface to stop using the specified encapsulation. The subinterface then returns to the default encapsulation (ARPA).

Syntax:

```
ethernetX/X.X config>no encapsulation <encapsulation type>
```

1.3.8.2 NO MAC ADDRESS

Deletes the locally-administrated MAC address to be used in the subinterface. The address given by the manufacturer is used for the base Ethernet interface of the subinterface that is being configured.

Syntax:

```
ethernetX/X.X config>no mac-address
```

Example:

```
ethernet0/0.1 config>no mac-address
ethernet0/0.1 config>
```

1.3.8.3 NO QOS-PRE-CLASSIFY

Disables packet pre-filtering in the respective BRS classes.

Syntax:

```
ethernetX/X.X config>no qos-pre-classify
```

Example:

```
ethernet0/0.1 config>no qos-pre-classify
ethernet0/0.1 config>
```

1.3.8.4 NO PORT-TAG

Eliminates the link between the subinterface and a switch port.

Syntax:

```
ethernetX/X.X config>no port-tag
```

Example:

```
ethernet0/0.1 config>no port-tag
ethernet0/0.1 config>
```

1.3.8.5 NO SWITCHPORT

Enables the subinterface to track the state of an associated port link. This checks, together with the rest of the associated ports, the state of the subinterface.

Syntax:

```
ethernetX/X.X config>no switchport autostate exclude <port>
```

Example:

```
Ethernet0/0.1 config>no switchport autostate exclude 2
Ethernet0/0.1 config>
```

1.3.9 PORT-TAG

Specifies a switch port number to be associated with a subinterface. This command is available in Ethernet subinterfaces with an Ethernet base interface associated with a switch that supports this functionality. Please contact our Sales Department for further information on supported platforms.

Configuring the port-tag parameter means:

- (1) Only traffic that enters through the specified switch port reaches the subinterface.
- (2) The subinterface output traffic is only transmitted through the specified switch port.
- (3) The specified switch port will be 'isolated' from the rest of the switch ports (transforming it into a 'WAN port' that is similar to an Ethernet interface on the motherboard).

The port-tag parameter is not incompatible with the 802.1Q encapsulation. Thus, if you configure both the port-tag parameter and a specific 802.1Q encapsulation (normal or double) the subinterface will only process the traffic that arrives with the encapsulation specified by the relevant switch port.

You cannot configure *port-tag* in cases where the switch port has the Spanning Tree protocol enabled through the **port <port_id> stp enable instance <i>** command (found on the switch configuration menu).

Syntax:

```
ethernetX/X.X config>port-tag <Port number>
```

Example:

```
ethernet0/0.1 config>port-tag 1
ethernet0/0.1 config>
```

1.3.10 QOS-PRE-CLASSIFY

Enables IP packet pre-classification in their respective BRS classes before being encapsulated and sent to the corresponding base interface to be subsequently transmitted.

Syntax:

```
ethernetX/X.X config>qos-pre-classify
```

Example:

```
ethernet0/0.1 config>qos-pre-classify
ethernet0/0.1 config>
```

1.3.11 SWITCHPORT

Prevents a switch port from having its link state tracked by the subinterface it is associated with.

Syntax:

```
ethernetX/X.X config>switchport autostate exclude <port>
```

Example:

If switch ports 2, 3 and 4 are associated with the subinterface with dot1q and you don't want the subinterface to track ports 2 and 4, then the commands are as follows:

```
Ethernet0/0.20 config>no switchport autostate exclude 2  
Ethernet0/0.20 config>no switchport autostate exclude 4  
Ethernet0/0.20 config>
```

1.3.12 EXIT

Exits the Ethernet subinterface configuration.

Syntax:

```
ethernetX/X.X config>exit
```

Example:

```
ethernet0/0.1 config>exit  
Config>
```

Chapter 2 Monitoring

2.1 Introduction

This chapter describes the commands that can be used to monitor the Ethernet subinterfaces. The following sections are included:

- Ethernet subinterfaces and their monitoring command.
- State of the Ethernet subinterface.
- Displaying the statistics.

2.2 Ethernet subinterfaces and their monitoring command

The router displays statistics on the interfaces as soon as the **device** command is entered in the global monitoring menu.

When the **device** command is entered followed by the Ethernet subinterface name, the router displays a series of associated statistics.

Syntax:

```
+device <Ethernet_subinterface_name>
```

Example:

```
+device
Interface          CSR      Vect      Auto-test  Auto-test  Maintenance
                  valids   failures  failures
ethernet0/0        FA200E00  27         3          26         2
serial0/0          FA200A00  5e         0          1824       0
serial0/1          FA200A20  5d         0          1824       0
serial0/2          FA200A60  5b         0          1824       0
bri0/0             FA200A40  5c         1           0         0
x25-node           0         0          1           0         0
ethernet0/0.1     0         0          3           1         1
+device ethernet0/0.1
Interface          CSR      Vect      Auto-test  Auto-test  Maintenance
                  valids   failures  failures
ethernet0/0.1     0         0          3           1         1
Physical address: 00A026700020
Speed:             100 Mbps
+
```

The meaning of the aforementioned fields is as follows:

<i>Interface</i>	Interface Name.
<i>CSR</i>	Control/status registers address. Since this is not a physical interface, this is 0.
<i>Vect</i>	Associated Interruption Vector. Since this is not a physical interface, this is 0.
<i>Auto-test valids</i>	Number of successful auto-tests.
<i>Auto-test failures</i>	Number of failed auto-tests.
<i>Maintenance failures</i>	Number of maintenance failures.
<i>Physical address</i>	MAC address used in the subinterface in canonical format.
<i>Speed</i>	Speed in Mbps at which the Ethernet base interface runs.

2.3 Status of the Ethernet subinterface

Using the configuration command (monitoring menu), you can learn about the subinterface status. Additionally, it displays the operating status of the interface from the point of view of the SNMP protocol (as defined in RFC 2233).

As previously mentioned, the state of the subinterface depends on the state of the link of the switch ports associated with it. If there are no associated ports, then the state of the subinterface is always active.

```
+configuration
```

```

bintec's Router, XXX S/N: 403/00567
P.C.B.=43 Mask=0502 Microcode=0000 CLK=49152 KHz BUSCLK=49152 KHz PCICLK=327
68 KHz
ID: AT-8F32R L2.156
Boot ROM release:
  BIOS CODE VERSION: 01.09.06 Jan 23 2006 15:47:42
  gzip Jan 23 2006 15:40:57
  io1 Jan 23 2006 15:47:35
  io2 Jan 23 2006 15:40:28
  io3 Jan 23 2006 15:47:35
START FROM FLASH L0 Watchdog timer Enabled
Software release: 10.7.0 Feb 8 2006 15:27:33
Compiled by INTEGRATOR on INTEGRATOR
Hostname: Active user:
Date: Tuesday, 02/22/06 Time: 13:52:38
Router uptime: 15h58m56s

Num Name Protocol
0 IP DOD-IP
3 ARP Address Resolution Protocol
4 H323 H323
6 DHCP Dynamic Host Configuration Protocol
11 SNMP SNMP
13 RIP Route Information Protocol
17 SIP SIP

7 interfaces:
Connector Interface MAC/Data-Link Status
LAN1 ethernet0/0 Ethernet/IEEE 802.3 Up
SERIAL0/WAN1 serial0/0 X25 Down
SERIAL1/WAN2 serial0/1 X25 Down
SERIAL2/WAN3 serial0/2 X25 Down
BRI/ISDN1 bri0/0 BRI Net Up
--- x25-node internal Up
--- ethernet0/0.1 IEEE 802.1Q/802.1P Up
SNMP OperStatus:
Interface OperStatus
ethernet0/0 Up
serial0/0 Down
serial0/1 Down
serial0/2 Down
bri0/0 Up
x25-node Up
ethernet0/0.1 Up
+

```

The possible states are as follows:

- **Up:** the subinterface is active.
- **Down:** the subinterface is not active. This is due to the base interface not being active.
- **Disabled:** the subinterface has been disabled through configuration (**shutdown** command).

The following values can be taken regarding the SNMP operating status:

- **Up:** The interface is ready to transmit and receive network traffic.
- **Down:** The interface is not operative.
- **Testing:** The interface is carrying out some type of test that prevents real-time traffic packets from being transmitted.
- **Unknown:** The operating status of the interface cannot be determined for unknown reasons.
- **Dormant:** The interface is active but waiting for some external event to begin transmitting or receiving packets. The interface switches to an UP state as soon as the expected event occurs. Ethernet subinterfaces are never in this status.
- **Not present:** This state is a refined *Down* state and indicates that the interface is down because a component is missing (typically hardware). Since Ethernet subinterfaces can only be created when the Ethernet base interface has been detected, they are never in this status.
- **Lower layer down:** This is another refined *Down* state. This case indicates that the interface is assembled over one or more interfaces and one of these latter ones is down. Ethernet subinterfaces do not distinguish between this

state and the normal *Down* state (i.e., whenever the Ethernet base interface is down, the Ethernet subinterface operating status is also Down).

2.4 Ethernet subinterface statistics

Through the **statistics** command, found in the monitoring menu, you can check the number of packets transmitted and received by the subinterfaces (as well as the corresponding bytes).

```
+statistics
```

Interface	Unicast		Multicast		Bytes	Packets	Bytes
	Pqts	Rcv	Pqts	Rcv	Received	Transmitted	Transmitted
ethernet0/0		10		9	861	22	315
serial0/0	0		0		0	0	0
serial0/1	0		0		0	0	0
serial0/2	0		0		0	0	0
bri0/0	0		0		0	0	0
x25-node	0		0		0	0	0
ethernet0/0.1		5		1	210	10	195

```
+
```

All frames received and transmitted through the subinterface are also counted in the base interface through which they were received.