Falcon

Product Technical Note

PTP Boundary Clock Configuration

Administrative Information		
Applicable models	**Part Number**	**Applicable software version**
Falcon-RX/812/G	7160 / 7161	8.0.16 and above
Falcon-MX/428/G/	7122 / 7123	7.4.25 and above
µFalcon-MX/G	7143	7.4.25 and above
µFalcon-MX/S	7085 / 7086	7.4.25 and above

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PTP Boundary Clock Configuration

This guide briefly describes how to configure Falcon-RX and MX models to operate as a PTP Boundary Clock (BC) switch in compliance with ITU-T G.8275.1, G.8275.2 and G.8265.1 profiles. To properly source and propagate timing signal the Falcon device must first be installed and connected to a PTP Grandmaster or another BC switch. Multiple BC switches can be cascaded in order to further propagate Timing across the network.

1 General Topology

PTP Boundary Clock switches includes two types of PTP ports:

- Slave Ports – connected to a PTP GM or other another BC switch Master port
- Master Ports – connected to Slave devices including other BC switches Slave Ports

In this chain like topology, every PTP aware device may start the lock acquisition process only after its upstream master device is properly locked. PTP frames exchanged between Master and Slave ports are terminated on the port ingress and will not be forwarded by BC switches.
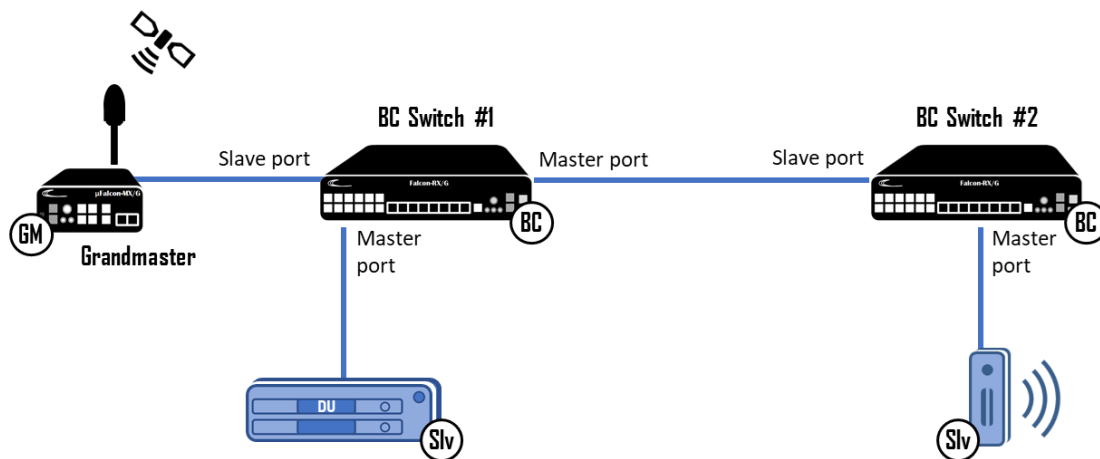
2 Configuration Steps

2.1 Initial Settings

Before starting with the Timing configuration ensure proper management access via web GUI. Detailed information on system turnup can be found in the Getting Started quick guide that can be found on www.fibrolan.com Resources section (login required).

2.2 Setting up the SyncCenter

- Hit the **SyncCenter** button at the GUI top right corner.
- On the **SyncCeter** webpage, first, select the desired operation mode: General / Hybrid. (for more information on Hybrid mode see section 2.5) For simple settings select the General mode.
- Enable source 1 and set it to PTP instance 0, as shown below, then press the Apply button at the bottom of the page.
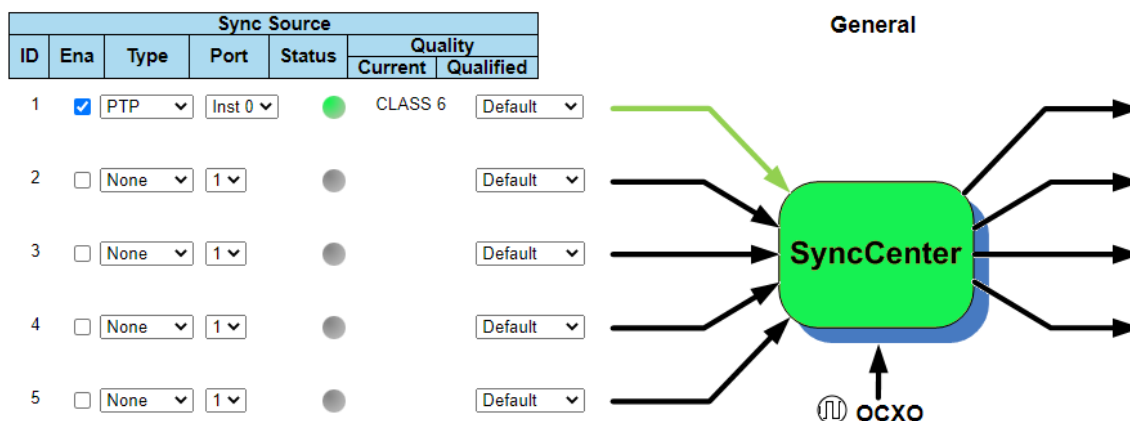
2.3 IP Interface

When creating a clock instance with IP transport layer (e.g. profiles G.8275.2 or G.8265.1) an IP address must be linked with the PTP instance. User can select the existing management IP address or create a new IP interface with a different VLAN and subnet.

IP Interfaces

Delete	IF	Enable	DHCPv4		Current Lease	IPv4 Address	Mask Length
				HEX			
☐	VLAN 1	☐				192.168.1.90	24
Delete	VLAN 20	☐				10.20.20.1	24

When a Layer 2 Muticast profile (i.e. G.8275.1) is selected, a dedicated IP address is not required

2.4 PTP Configuration

To create a new PTP clock instance hit the PTP button at the GUI top right corner. Alternatively select it from the left side menu: **Configuration>Timing>PTP**

2.4.1 Single Instance BC Configuration

Creating an Ordinary Boundary Clock instance, the user only needs to select the profile and relevant interfaces. The Falcon switch will automatically detect the Master and Slave ports.

- Hit the PTP link from the left side menu: **Configuration>Timing>PTP**
- Create a new PTP Clock instance and set it to **Ord-Bound** type
- Select the desired profile: **G.8275.1, G.8275.2, G.8265.1, etc.**

PTP Clock Configuration

Delete	Clock Instance	HW Domain	Device Type	Profile	Clock Description
Delete	0	0	Ord-Bound ∨	No Profile ∨	

No Profile
1588
G8265.1
G8275.1
802.1AS
SMPTE ST 2059-2
G8275.2

Add New PTP Clock

Apply   Reset

PTP Status   SyncCenter Config

- After applying hit the instance number to go to the next configuration page.
- Enable the relevant physical interface by checking the checkboxes of the relevant ports.

Port Enable and Configuration

Port Enable											Configuration
1	2	3	4	5	6	7	8	9	10	11	**Ports Configuration**
☐	☐	☑	☑	☐	☐	☐	☐	☐	☐	☐	

- Modify the VID value if needed (default is 1, same as the default VLAN)
- Set Step mode to Two-Step **True** or **False** as required (default is False, i.e. One-step)
- **Apply** the configuration by pressing the Apply at the bottom of the page.

If a unicast profile was selected (e.g. G.8275.2 or G.8265.1) continue with the following steps

- Hit the Ports Configuration link on the right side of the table
- Set the slave port frame rate to the following recommended rates (others are possible):
  - Ann.   (-3) 8/sec
  - Sync   (-4) 16/sec
  - Del.Req   (-4) 16/sec

PTP Clock's Port Data Set Configuration

| Port	Stat	MDR	PeerMeanPathDel	Announce	Ann.TO	Sync	Dlm	Del.Req	As
3	slve	-4	0.000,000,000	(-3) 8/sec ∨	3 ∨	(-4) 16/sec ∨	e2e ∨	(-4) 16/sec ∨	0
4	mstr	-4	0.000,000,000	(-3) 8/sec ∨	3 ∨	(-7) 128/sec ∨	e2e ∨	(-7) 128/sec ∨	0

- **Apply** the configuration then hit the **Back** button.
- Enter the GM or upstream BC IP address in the table Unicast Slave Table

Unicast Slave Configuration

Index	Duration	IPv4_address	IPv6_address
0	300	10.20.20.100	::
1	300	0.0.0.0	::

2.4.2 Multi-Instance BC Configuration

When GM and Slave devices do not support the same PTP parameters or required to be configured differently the Falcon BC switch can be configured to bridge the gap by creating separate Slave and Master instances. The Slave instance is connected to the GM and configured to sync on its signal, while the Master instance is connected to the Slave device and propagate the Timing signal to it.
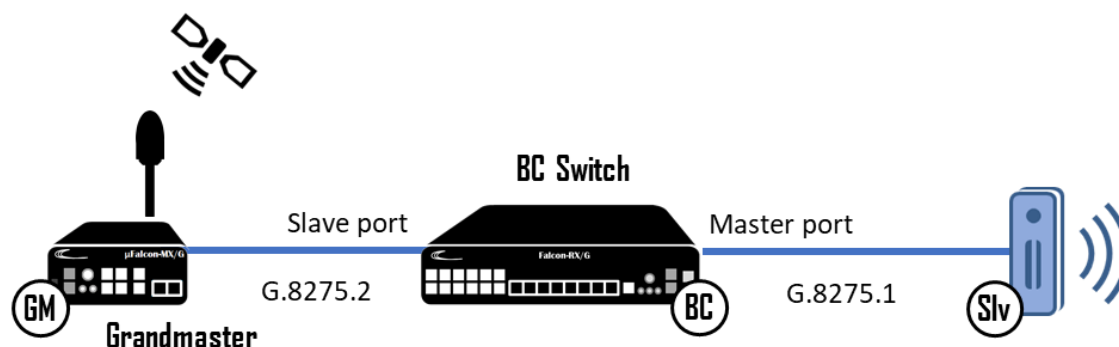
Each of the Instances can be set to a different profile based on the required architecture. For example, Master instance can be G.8275.1, while Slave instance G.8275.2.

PTP Clock Configuration

Delete	Clock Instance	HW Domain	Device Type	Profile	Clock Description
☐	0	0	Slaveonly	G8275.2	
☐	1	0	Mastronly	G8275.1	

- Enable the port connected to the GM on the Slave instance
- Set the slave port frame rate to the following recommended rates (others are possible):

    - Ann.   (-3) 8/sec
    - Sync   (-4) 16/sec
    - Del.Req   (-4) 16/sec

PTP Clock's Configuration and Status

Clock Type and Profile

Clock Instance	HW Domain	Device Type	Profile	Apply Profile Defaults	Filter Type
0	0	Slaveonly	G8275.2	Apply	ACI_BASIC_PHASE_LOW ⌄

Port Enable and Configuration

Port Enable											Configuration
1	2	3	4	5	6	7	8	9	10	11	**Ports Configuration**
☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	

- Enable the port connected to the Slave on the Master instance

Clock Type and Profile

Clock Instance	HW Domain	Device Type	Profile	Apply Profile Defaults	Filter Type
1	0	Mastronly	G8275.1	Apply	ACI_BASIC_PHASE_LOW ⌄

Port Enable and Configuration

Port Enable											Configuration
1	2	3	4	5	6	7	8	9	10	11	**Ports Configuration**
☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	

- **Apply** the configuration by pressing the Apply at the bottom of the page.

Notes:

- Slave instance must be configured as clock instance 0
- Unicast instance must be linked to IP interface (mgmt. or dedicated)
- PTP VID must be added to static VLAN table respectfully (if not default)

2.5 Hybrid Mode

To increase the BC switch's accuracy and stability, it is recommended to use SyncE as frequency source while sourcing phase and ToD via PTP. To implement this setting, the SyncCenter mode should be set to Hybrid.

- Set Frequency source type to **SyncE** and select the port leading to the GM

SyncCenter Configuration

Mode | Hybrid ∨

[**Frequency**] [Phase] [ToD]

		Sync Source				
					Quality	
ID	Ena	Type	Port	Status	Current	Qualified
1	☑	SyncE ∨	GE/5 ∨	🟢	PRC (02)	Default ∨

- Set Phase source **PTP** Inst.0

[Frequency] [**Phase**] [ToD]

		Sync Source				
					Quality	
ID	Ena	Type	Port	Status	Current	Qualified
1	☑	PTP ∨	Inst 0 ∨	🟢	CLASS 6	Default ∨

- Set ToD source **PTP** Inst.0

[Frequency] [Phase] [**ToD**]

		Sync Source				
					Quality	
ID	Ena	Type	Port	Status	Current	Qualified
1	☑	PTP ∨	Inst 0 ∨	🟢	CLASS 6	Default ∨

- **Apply** the configuration by pressing the Apply at the bottom of the page.

- **Enable** SyncE SSM on the BC switch relevant ports (Master and Slave ports)

SyncE Ports

Port	SSM Enable	Tx SSM Quality level	Tx SSM SSM code (hex)	Rx SSM Quality level	Rx SSM SSM code (hex)	1000BaseT Mode
1	☑	QL_INV	F0 (h)	QL_INV	00 (h)	Master ⌄
2	☐					Master ⌄
3	☐					Master ⌄
4	☐					Master ⌄
5	☑	QL_DNU	0F (h)	QL_PRC	02 (h)	Master ⌄
6	☐					Master ⌄
7						

- **Save** the configuration by hitting the Save button at the GUI top left corner.

Falcon-RX/812/G xHaul Switch

3 Status Validation

3.1 SyncCenter Monitor Display

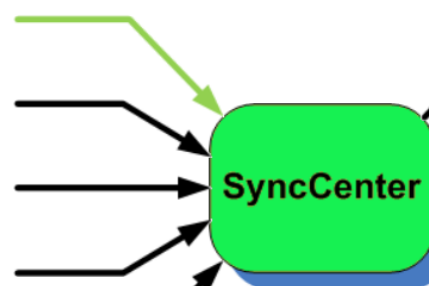- Verify all Hybrid mode sources (Frequency, Phase and ToD) are valid and locked

SyncCenter Status

Mode | Hybrid

Frequency | Phase | ToD

Frequency

		Sync Source			Quality Current	Quality Qualified
ID	Ena	Type	Port	Status	Current	Qualified
1	☑	SyncE	GE/5	🟢	PRC (02)	Default
2	☐	None		⚫		Default
3	☐	None		⚫		Default
4	☐	None		⚫		Default

		SyncCenter General Status			WTR	
State	Locked to	Offset from GPS (nSec)	Time in State	Time in current output quality	Active	Time
Locked		N.A	1d 23:18:19	1d 23:18:19	⚫	12

- Confirm the correct UTC Time

		Time	
UTC to TAI Config	Mode	UTC to TAI Status	UTC Time
37	1	37	2022-01-26T10:25:02+00:00

3.2   PTP Clock Status

- Confirm the correct PTP Time

Local Clock Current Time

PTP Time	Clock Adjustment method	Ports Monitor Page
2022-01-26T10:28:59+00:00 936,528,120	Internal Timer	Ports Monitor

- Confirm PTP Inst.0 Slave state is in PHASE_LOCKED

Clock Current DataSet

stpRm	Offset From Master	Mean Path Delay	Slave Port	Slave State	Holdover(ppb)
1	0.000,000,000,968	0.000,000,010,082	5	PHASE_LOCKED	0.0

- Confirm PTP Inst.0 is locked on the correct Grandmaster ID and GM Clock Class is 6

Clock Parent DataSet

Parent Port ID	port	PStat	Var	Rate	GrandMaster ID	GrandMaster Clock Quality	Pri1	Pri2
00:05:80:ff:fe:07:16:60	2	False	0	0	00:05:80:ff:fe:07:16:60	Cl:006 Ac:100 ns Va:20061	128	128

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