FAQ Nx70 - Precision Time Protocol (PTP)

Introduction

The Precision Time Protocol (PTP) is a protocol used to synchronize clocks throughout a computer network. On a local area network, it achieves clock accuracy in the sub-microsecond range, making it suitable for measurement and control systems.

Valid for:	
N670	N870

If LAN synchronization is used, PTP is used to synchronise the N870 base stations.

- The N870 can be an PTP Master
- PTP deviation must be lower than 500 ns
- PTP deviation > 500 ns might just generate warnings. If deviation is continuously exceeding 500 ns then PTP is considered broken and new synchronisation procedure is started and can take up to 30 seconds
- Other devices can also be an PTP Master see for example the wikipedia page
- Switches do not need to be PTP aware but the settings should consider the mentioned guidelines
- Using PTP Domains, we can create multiple PTP domains in case the network topology is causing PTP delays or other PTP issues. See below for more info and examples.

Domains

A domain is an interacting set of clocks that synchronize to one another using PTP. Clocks are assigned to a domain by virtue of the contents of the Subdomain name fields in PTP messages they receive or generate. Domains allow multiple clock distribution systems to share the same communications medium.

In the N870 you can create Clusters : **SETTINGS - Base stations - Synchronisation**. These clusters are used for **DECT** and **LAN** synchronisation.

The settings below shows dependent on the selected cluster, which PTP domain will be used.

N870 Common PTP domain	PTP subdomainNumber
Cluster 1-c	21
Cluster 2-c	21
Cluster 3-c	21
Cluster 4-c	21
Cluster 5-c	21
Cluster 6-c	21
Cluster 7-c	21

N870 Isolated PTP	PTP subdomainNumber
Cluster 8-i	28
Cluster 9-i	29
Cluster 10-i	30
Cluster 11-i	31
Cluster 12-i	32
Cluster 13-i	33
Cluster 14-i	34
Cluster 15-i	35

Below is an wireshark example: You can see that the dependent on the Cluster settings, the device will add the **subdomainNumber**.

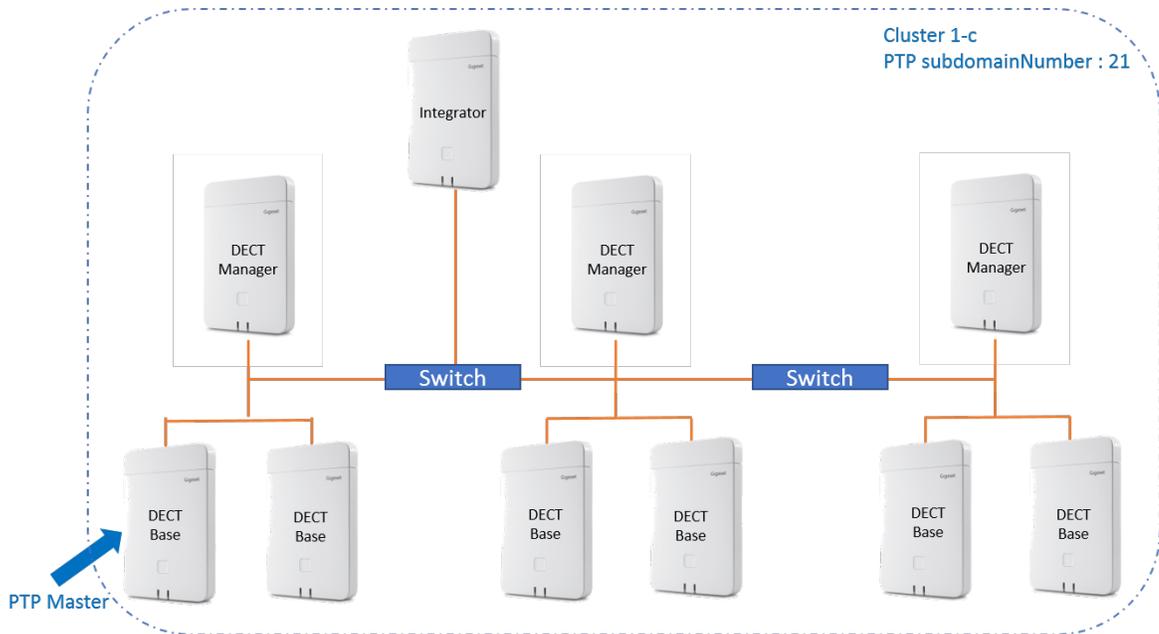**Wireshark example**

Precision Time Protocol (IEEE1588)
0000 .... = transportSpecific: 0x0
.... 0000 = messageId: Sync Message (0x0)
.... 0010 = versionPTP: 2
messageLength: 44
subdomainNumber: 21
flags: 0x0200
0... .... = PTP_SECURITY: False
.0.. .... = PTP profile Specific 2: False
..0. .... = PTP profile Specific 1: False
.... .0.. .... = PTP_UNICAST: False
.... ..1. .... = PTP_TWO_STEP: True
....0 .... = PTP_ALTERNATE_MASTER: False
....0. .... = FREQUENCY_TRACEABLE: False
....0 .... = TIME_TRACEABLE: False
.... 0... = PTP_TIMESCALE: False
.... .0.. = PTP_UTC_REASONABLE: False
....0. = PTP_LI_59: False
....0 = PTP_LI_61: False
correction: 0.000000 nanoseconds
correction: Ns: 0 nanoseconds
correctionSubNs: 0 nanoseconds
ClockIdentity: 0x589ec6fffe0d8c73
SourcePortID: 1
sequenceId: 5275
control: Sync Message (0)
logMessagePeriod: -1
originTimestamp (seconds): 0
originTimestamp (nanoseconds): 0

Examples

Example A:
One PTP Master.

- N870 is PTP Master, whole system is using LAN synchronisation
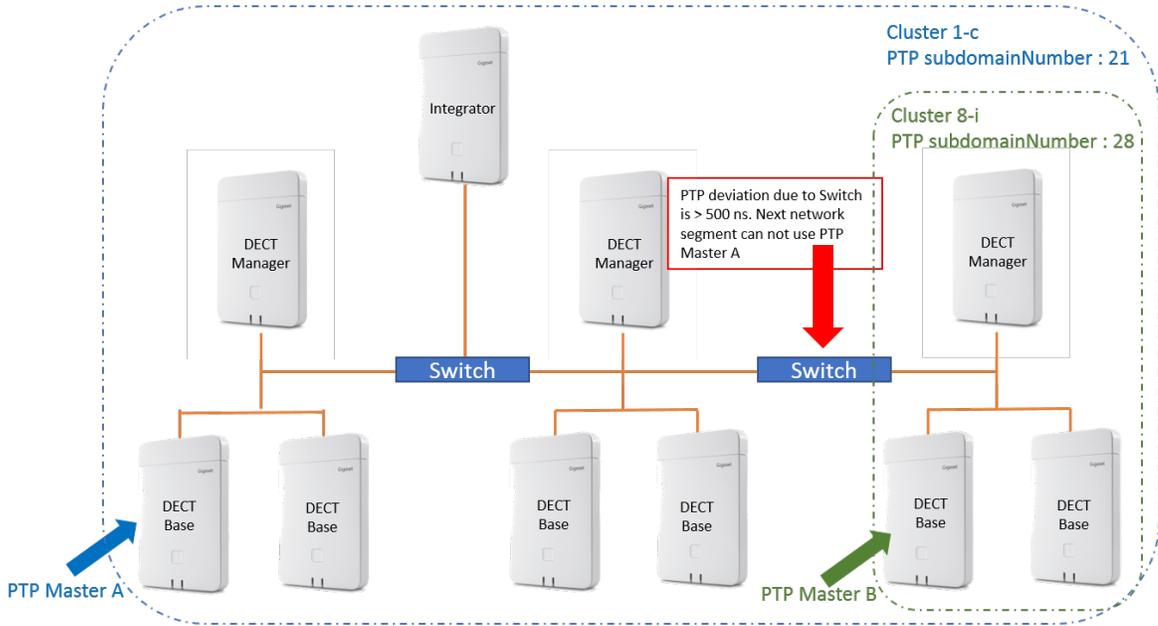- Customer network is an common PTP (Precise Time Protocol) enabled multicast domain
- All N870 devices are in Cluster 1-c and use the N870 PTP Master
- How DECT Manager synchronisation is set-up is not part of this article

Example B:

Due to switches in the network, the last network segment can't use the PTP Master A. Deviation > 500ns.

Cluster 1-c
PTP subdomainNumber : 21

Cluster 8-i
PTP subdomainNumber : 28

Integrator

DECT Manager

DECT Manager

DECT Manager

PTP deviation due to Switch is > 500 ns. Next network segment can not use PTP Master A

Switch

Switch

DECT Base

DECT Base

DECT Base

DECT Base

DECT Base

DECT Base

PTP Master A

PTP Master B

- PTP messages are not blocked by the switches and can be received by all devices
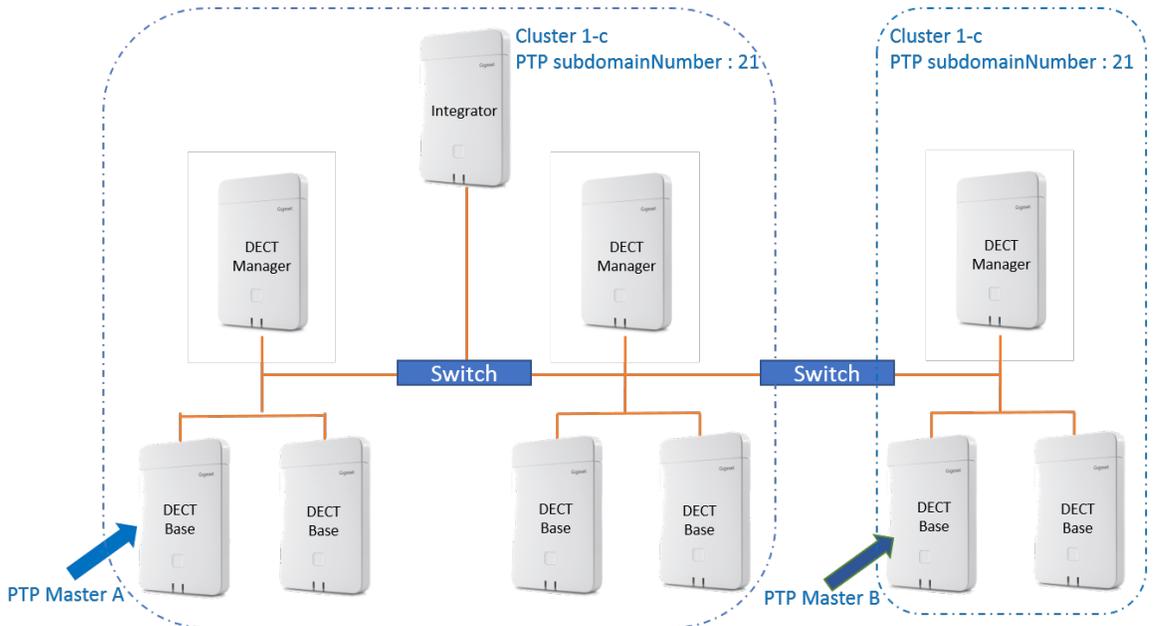- After measurement, the PTP deviation in the last network segment > 500 ns
- An new PTP Master B needs to be created for the last network segment
- As PTP messages are send/received over the whole network, the PTP domain must be different
- PTP Master A has setting cluster 1-c and uses PTP subdomainNumber 21, PTP Master B has setting cluster 8-i (Isolated PTP cluster) and uses PTP subdomainNumber 28
- How DECT Manager synchronisation is set-up is not part of this article

Example C:

Due to switches in the network, the last network segment does not receive the PTP messages from PTP Master A

Cluster 1-c
PTP subdomainNumber : 21

Cluster 1-c
PTP subdomainNumber : 21

Integrator

DECT Manager

DECT Manager

DECT Manager

Switch

Switch

DECT Base

DECT Base

DECT Base

DECT Base

DECT Base

DECT Base

PTP Master A

PTP Master B

- The right switch blocks the PTP messages from PTP Master A
- An new PTP Master B needs to be created for the last network segment
- As PTP messages are blocked by the switch, the right segment could also use cluster 1-c with PTP subdomainNumber 21
- PTP Master A has setting cluster 1-c and uses PTP subdomainNumber 21, PTP Master B has setting cluster 1-c and uses PTP subdomainNumber 21
- How DECT Manager synchronisation is set-up is not part of this article