

FAQ Nx70 - LAN synchronisation

Introduction

If the DECT connection between base stations seems to be not reliable enough to permanently guarantee a stable DECT over the air synchronization, e.g., because they are separated by iron doors or a firewall, you can determine that synchronisation should take place via LAN. In this case the base station with the higher sync level will act as LAN master, the base station with the lower sync level is a LAN slave. One base station must be explicitly be defined as LAN master. Currently, it must be on DECT sync level 1.

Valid for:	
N670	N870

Advantage:

- No Synchronization levels needs to be configured.
- When a base station fails (Not the LAN Master) it will not have any impact on the other base stations.
- Fewer base stations required as the overlapping area of the base stations is smaller. The overlapping area for handset handover can be smaller, because neighboured base stations do not need to receive each other in stable error free quality, but they must still be able to detect each other for the process of dynamic channel selection.

Disadvantage:

- Base stations must be in the same network segment.
- Precision Time Protocol (PTPv2), deviation must be lower then 500 ns (rms).
- High reliable LAN network is needed, see below for the requirements.



LAN synchronisation can look to be more easy then DECT synchronisation, but the Customers network has to be very reliable and network knowledge is required. Gigaset offers the possibility to measure the delay/quality but we can not advise you how to configure your switches as we are not the experts for these switches.

In case of bad network quality, it can take some seconds before the synchronization is lost. When this happens, all active calls of this base station are disconnected. It can take up to some minutes before synchronization is active again.

Network requirements

Consider the following network requirements.

- The less switch hops. the lower the transmission delay and its jitter will be.
- The higher the bandwidth or quality of used switches is regarding packet delay and its jitter, the lower the packet delay and the lower the packet delay jitter will be.
- Enhanced packet processing logics (like L3 switching or packet inspection) could have significant negative impact on the resulting packet delay jitter. If possible, they should be deactivated for the N870 base stations connected switch ports.
- Significantly increased traffic load on a switch, in the range of the maximum throughput, could have significant negative impact on the packet delay jitter.
- VLAN based prioritisation of LAN packets could be a fruitful measure to minimize packet delay and its jitter for N870 base stations.

Hints regarding PTP deviation.

LAN synchronisation is based on a two layer design:

- Native PTPv2 is used to synchronise a common reference timer along all base stations involved.
Target quality benchmark to provide sufficient PTP synchronisation along the base stations, is to have a PTP deviation lower than 500 ns (rms). For this PTP synchronisation a few single deviations > 500 ns are accepted and might just generate first warnings. If the PTP sync packet deviation does continuously exceed this limit of 500 ns, the PTP synchronisation is considered broken and will lead to new start synchronisation procedure.
- Based on the PTP synchronisation LAN master and LAN slave adjust their DECT reference timer to one common offset to the common PTP reference timer. This common offset will be permanently monitored by a proprietary communication.
The target quality benchmark for this synchronisation level is to see reference timer deviation by this DECT reference timer sync packets: DECT-LAN-Sync deviation lower than 1000 ns. A good mean value would be 500 ns (rms).

To meet this criteria the switches themselves do not necessarily need to be PTP aware. But the network should consider the above mentioned guidelines to meet this criteria.

DECT requirements

When using LAN synchronization, it does not mean that the DECT signal quality is not important anymore. You still need to do an DECT measurement.

- Base stations that are synchronized via LAN must be able to see the neighbor base stations via an stable DECT signal.

For this you can use the DECT measurement kit. A value of **-75 dBm** is enough.

LAN sync measurement

To check if the customers network can be used for LAN synchronisation. You can install an Integrator / DECT manager and some base stations in the customer network that are synchronised via LAN.

From software 2.29.1 we have the LAN sync quality visible in the Base-station events see: [FAQ Nx70 - Base station events, q-idx-lt, o-thr-exc, d-thr-exc \(LAN synchronization\)](#)

For previous software, see below.

[Enable the CLI access](#) on the Integrator / DECT manager.

Connect a PC to the customer network and run the batch script below that connects with the DECT base stations that are synchronised via LAN. You do not need to connect to the DECT manager.

Run the [Batch file](#) below.

1. Results will be written every minute in the c:\temp\ directory when not available change the script to write to another directory.
2. Change the host= to the IP address of your base station.
3. Change the password= to the CLI password.
4. The ssh_client= points to the location of plink.exe that is part of PuTTY. You can find PuTTY on the Internet.

Let it run for a day or longer and check if the values are within the supported limits.



Collect LAN sync batch file

```
@echo off
setlocal enabledelayedexpansion

set logfile="c:\temp\BS1_%date:~-4,4%%date:~-10,2%%date:~-7,2%%_time:~0,2%%time:~-3,2%.dlsd.status.log"
set host="192.168.178.190"
set password="password"
set ssh_client="c:\Program Files\PuTTY\plink"

echo Start dlsd.status.log at %host% !time! > %logfile%
FOR /L %%N IN (1,1,1440) DO (
echo ***** >> %logfile%
echo new dlsd status logged at !time! >> %logfile%
echo new dlsd status logged at !time!
%ssh_client% -pw %password% cli@%host% "cat /tmp/log/dlsd.status" >> %logfile%
ping 127.0.0.1 -n 61 > nul
)
```

Output

You will get the following output:

dls- stats :	=====					
TS ----- :	1542352181.000000533				Timestamp of table generation	
HOST ---- :	base-7c2f80e0d6d7				Hostname	
SYS ---- :	dls- mode - ,	syn- mode ,	lan-m ---- ,	ptp-m ---- ,	-- state ----	SYS-dls-mode: client device runs in client mode. master device runs in master mode SYS-syn-mode: DECT device runs in DECT sync mode. LAN device runs in LAN sync mode SYS-lan-m: ON device is LAN-master. OFF device is LAN-client SYS-ptp-m: not used at the moment SYS-state: SYNC (80) means sync in client mode, every other state is async. SYNC (10) for master mode (means sync per definition)
	client,	LAN,	OFF,	OFF,	SYNC (80)	
DBC ---- :	dm-id ---- ,	cluster -- ,	cl- mask -- ,	level ---- ,	-- Info -----	DBC-dm-id: ID of Dectmnager the device is currently bound to DBC-cluster: DECT sync cluster DBC-cl_mask: DECT sync cluster mask, the cluster value can be masked internally by dlsd configuration to sync to a LAN master that is part of another cluster DBC-level: DECT sync level DBC-Info: Flag word given by DECT-DBC
	0x102 e70f1,	1,	0x000 000f8,	2,	0xb00 1e000	
PTP ---- :	gm-id ----- ,		domai n -- ,	-----		PTP-gm-id: PTP grand master clock id PTP-domain: PTP domain, dlsd is using domain 21 as default
	7c2f80.ffe. c6e5c2,		21,			
DLS ---- :	m-id ----- ,		-----			DLS (DECT Lan sync) master id
	7c2f80.ffe. c6e5c2,					
QUALI TY - :	async ---- ,	o_thr_ exc ,	----- ,	----- ,	----- ----	QUALITY-async: async counter QUALITY-o_thr_exc: Out of sync threshold exceeded
	0,	11,				
TIMING -- :						
CURR ENT - :	ptp- pd---- ,	ptp- d---- ,	dls- d---- ,	osc-idx -- ,	----- ----	
	24225,	120,	198,	175		
STATS --- :	rms ----- ,	min ----- ,	max ----- ,	mean ---- +/-	stddev ---	The statistics are generated of a window containing 60 values. They contain rms. min, max, mean and stdev for each value
p(av) [ns] :	16000 1403,	16000 1352,	16000 1465,	160001 403 +/-	25	period of the DECT-SYPO signal
frq [MHz] :	13.823 879,	13.82 3876,	13.823 882,	13.8238 79 +/-	0.0000 02	Calculated frequency of the DECT oscillator
osc- idx :	173,	172,	174,	173 +/-	0	DECT oscillator capacitor field index
ptp-pd [ns]:	24193,	23764,	24541,	24192 +/-	198	ptp path delay This is an indication of the transmission path quality. The account of switches and their processing speed and queue delay's influence this value. Jitter should be as less as possible. (This can easily be interpreted by the stddev value)
ptp-d [ns]:	224,	-422,	558,	12 +/-	224	ptp clock delay Ptp clock offset to master clock This value should not exceed 500ns for a longer time
dls-d [ns] :	251,	-513,	549,	-13 +/-	250	Measured offset of the local DECT-SYPO signal to the master DECT-SYPO signal. This is the DECT-SYNC criteria and should not exceed 1000ns for a longer time
eof dls-stats =====						

Important are the values below:

QUALITY - :	async ---- ,	o_thr_exc ,
	0,	11,
	This field shows you how many times the base kas lost synchronisation.	

