GPS-Synchronized Digital Clock System

Angola pharmaceutical facility

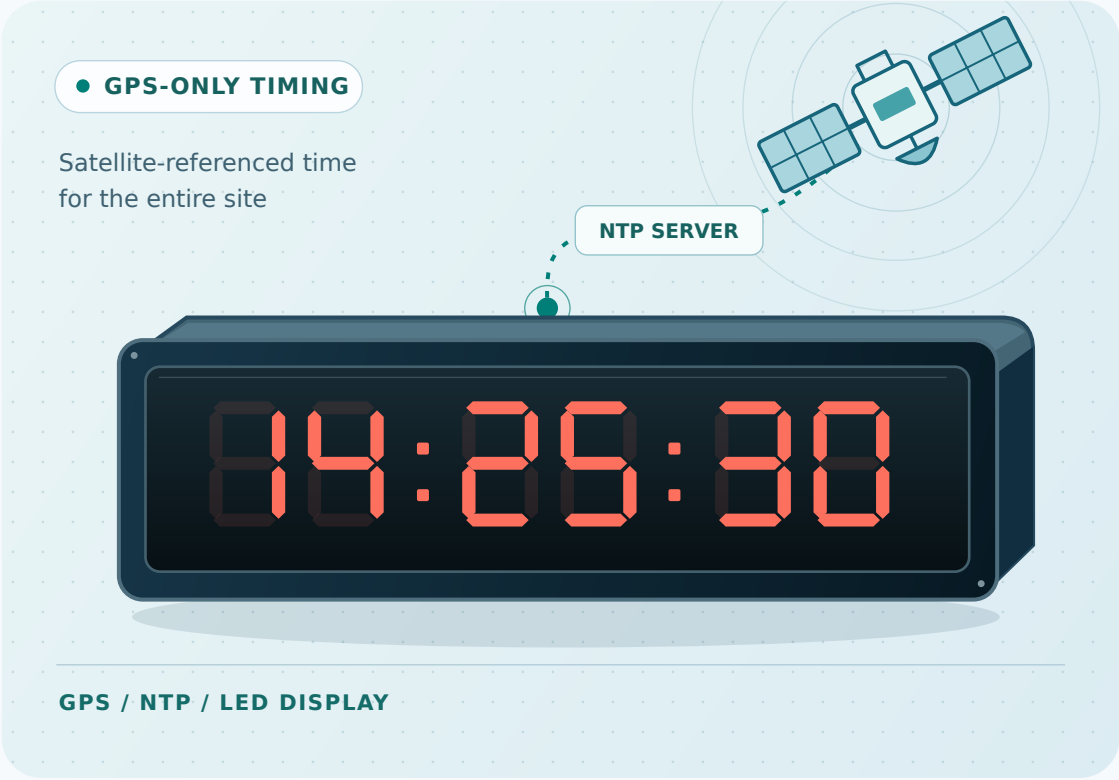
One GPS-only time server synchronizes 20 LED wall clocks across production areas and offices.

20
LED wall clocks

01
GPS time source

NTP
Site Ethernet

Topology 03 **Clock layout 04** **LAN drops 11**



One time reference across the facility

Production staff and office teams use the same Angola local time.



01 / PRODUCTION

Production areas

Wall displays provide a shared time reference without occupying benches.

02 / ADMINISTRATION

Offices and shared areas

The same NTP source serves office and shared-area clocks over the site network.

03 / LOCAL DISPLAY

Angola local time

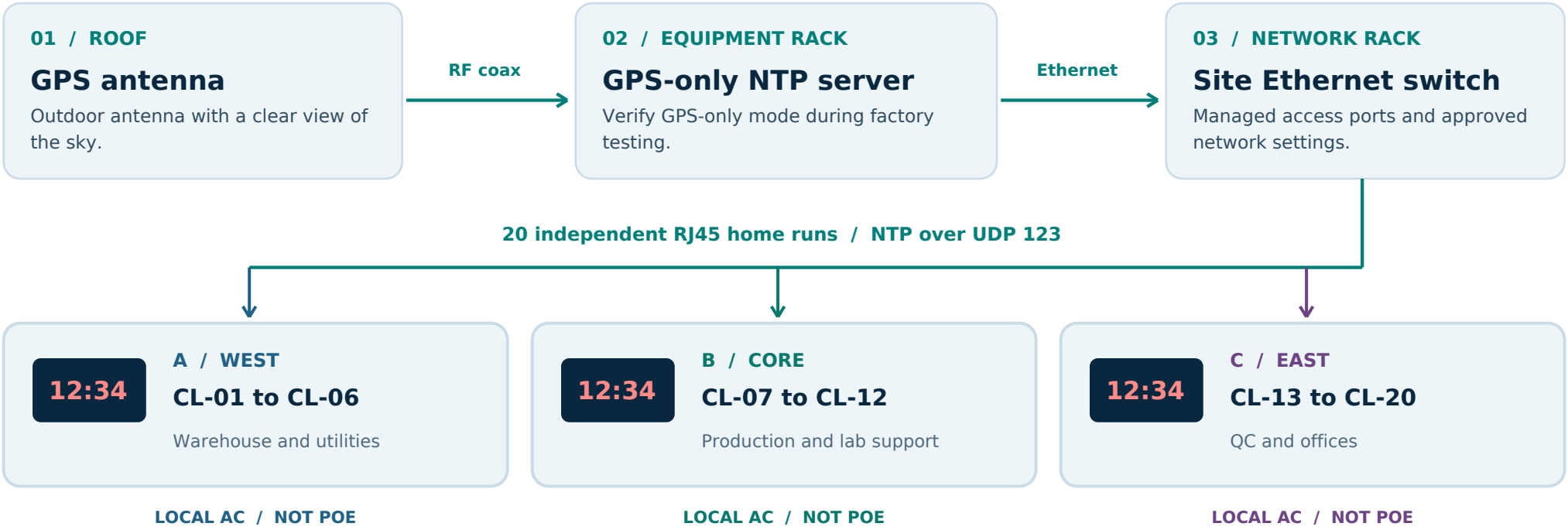
Distribute UTC with NTP. Configure each clock for WAT (UTC+01:00), with no daylight-saving change.

MOUNTING AND CLEANING

Confirm sightlines, mounting height and local power at all points. Confirm cleaning and enclosure suitability before mounting in production areas; coordinate penetrations with the facility team.

GPS to 20 LED clocks

A single GPS-only NTP server feeds the site LAN. Each display polls the server independently and receives local AC power.



NETWORK & POWER

Allow client requests to the project NTP server on UDP destination port 123 and allow replies. Assign and document addressing. Use separately approved local AC at all clock positions.

LOSS OF SIGNAL OR SERVICE

One server is a single point of failure. Confirm model-specific holdover and loss-of-sync behavior, and monitor GPS lock, NTP health and recovery.

20-clock connection layout

Illustrative distribution of 20 clocks across three functional groups.

CLOCK GROUPS

FUNCTIONAL SCHEMATIC

WEST • WAREHOUSE & UTILITIES

CL-01 | CL-02 | CL-03 | CL-04
CL-05 | CL-06

CORE • PRODUCTION & LAB SUPPORT

CL-07 | CL-08 | CL-09 | CL-10
CL-11 | CL-12

EAST • QUALITY CONTROL & OFFICES

CL-13 | CL-14 | CL-15 | CL-16
CL-17 | CL-18 | CL-19 | CL-20

Solid: planned | Dashed: proposed

LOGICAL PATCHING

NTP server → site LAN / patch panel
One independent RJ45 run per clock

A • WEST / 06 DROPS
CL-01 to CL-06 | Warehouse and utilities

B • CORE / 06 DROPS
CL-07 to CL-12 | Production and lab support

C • EAST / 08 DROPS
CL-13 to CL-20 | QC and offices

Solid: planned points CL-01 to CL-17. Dashed: proposed office points CL-18 to CL-20.

Confirm switch location, cable routes, mounting surfaces and power at the site survey. Individual connections are listed on page 11.

Clock IDs and network drops

Assign the switch port, mounting height and power circuit for each clock during the site survey.

CLOCK	FUNCTIONAL AREA	DROP ID
CL-01	Warehouse / utilities	D-01
CL-02	Warehouse / utilities	D-02
CL-03	Warehouse / utilities	D-03
CL-04	Warehouse / utilities	D-04
CL-05	Warehouse / utilities	D-05
CL-06	Warehouse / utilities	D-06
CL-07	Production / lab support	D-07
CL-08	Production / lab support	D-08
CL-09	Production / lab support	D-09
CL-10	Production / lab support	D-10

CLOCK	FUNCTIONAL AREA	DROP ID
CL-11	Production / lab support	D-11
CL-12	Production / lab support	D-12
CL-13	Quality control / offices	D-13
CL-14	Quality control / offices	D-14
CL-15	Quality control / offices	D-15
CL-16	Quality control / offices	D-16
CL-17	Quality control / offices	D-17
CL-18	Office area [proposed]	D-18
CL-19	Office area [proposed]	D-19
CL-20	Office area [proposed]	D-20

FIELD RECORD

For each clock, record the final wall position, outlet and switch/port, IP or DHCP reservation, asset serial number, power circuit, observed local time and acceptance result.

Equipment and configuration

20 wall clocks, one GPS-only NTP server and one antenna assembly.

QTY	EQUIPMENT	SPECIFICATION	INSTALLATION / VERIFICATION
20	HCE-LS100 LED clock	Single-sided, English face, red display; wall mount. 490 × 190 × 44 mm. RJ45 Ethernet with standalone NTP support.	Local 220 VAC ±20%, 50 Hz ±5%. Confirm site supply and wall fittings. Separate AC power is required.
1	GPS-only NTP server	Rack-mounted NTP time server configured for GPS-only operation.	Confirm exact ordering configuration and antenna match. During factory testing, verify GPS-only mode, GPS lock and NTP interoperability with HCE-LS100.
1 set	GPS reception path	Outdoor GPS antenna, matched coax and mounting; entry protection/bonding per survey.	Confirm antenna compatibility, cable loss budget, route, entry protection and site grounding design.
Optional	Clock management software	Monitoring and configuration. Clocks synchronize independently of the software.	Confirm commercial scope, OS, licensing, and compatibility with the delivered model; management PC is not assumed included.
As needed	Network / local power	Twenty clock drops and approved local AC endpoints; switch capacity, uplinks and UPS by IT/site design.	Planning basis: 24 usable ports: 20 clocks + 1 server + 1 optional PC + 1 uplink leaves 1 spare. Recalculate for actual switch design.

GPS-ONLY FACTORY ACCEPTANCE

Factory acceptance checks cover GPS-only configuration, satellite lock and synchronization of the proposed clock model.

Installation and acceptance

Facilities and IT agree on installation routes, time tolerances and any resilience requirements before work begins.

STEP	FIELD WORK	EVIDENCE / ACCEPTANCE
01 Survey	Confirm roof sky view, rack, switch ports, approved cable pathways and local power. Review wall fixings and production-area work permits.	Approved routes and antenna location; check 20 positions for visibility, clearance and power.
02 Install	Mount antenna and server, verify RF path, label each RJ45 drop, install clocks and local AC. Coordinate bonding and surge protection with site electrical.	As-installed records: antenna path, outlet/port map, clock serials and measured/verified local supply.
03 Configure	Record GPS-only mode, GPS lock, server address, client configuration and local WAT settings. Restrict NTP access to approved client networks.	20/20 clock records: correct ID, server, local time, requested display format and synchronization status. Compare observed time against an approved reference.
04 Test recovery	Check restart, NTP reachability, loss of GPS and recovery under an approved test window. Include network or power interruption as agreed.	Record observed offset and recovery time against pre-agreed limits, alarm/status and recovery notes.
05 Handover	Document final drawings, exceptions, configuration backup and support contacts. Train site personnel on lock/health and first checks.	Joint facilities/IT sign-off, acceptance exceptions and action owners.

SITE APPROVAL

Confirm cable specifications and routes, power circuits and acceptance thresholds before installation.

Equipment overview

LED wall clock, rack-mounted NTP server and optional clock management software.

A1

HCE-LS100 LED wall clock



Single-sided wall display. Confirm the required time and date display format before order release.

A2

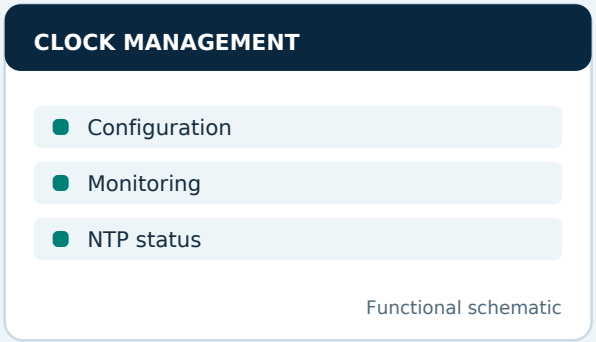
NTP server reference



Reference enclosure. The GPS-only supply model is subject to equipment approval.

A3

Clock management software



Optional software for clock configuration and monitoring. Confirm interface language and compatibility.

SUPPLY CONFIRMATION

The clock synchronization design does not depend on the optional management PC. Verify the delivered clock, server and antenna combination at factory acceptance.

Installation coordination checklist

Survey and handover requirements for the antenna, equipment rack, site network and clock locations.

INTERFACE	CONFIRM BEFORE INSTALLATION	RECORD IN THE HANDOVER PACK
Antenna and building entry	Confirm roof position, safe access, coax type and length, compatible entry protection and bonding.	Antenna position, approved cable route, entry detail and evidence of GPS lock.
Equipment rack	Confirm mounting space, ventilation, supply, protected circuits and any UPS scope.	Server serial number, GPS-only configuration, rack location and restart behavior.
Site network	Confirm IP assignments or DHCP reservations, approved VLAN, NTP reachability and switch port budget.	Clock ID to outlet, patch and switch port; server address and configuration backup.
Clock points	Verify the 17 designated positions and agree on the 3 proposed office positions. Check sightlines, mounting and cleaning requirements.	As-built clock locations and wall faces, local AC circuits, display format and SAT result.

FIELD CHANGE CONTROL

If a clock position changes, update its ID-to-location mapping and routing record before commissioning. Retain the same ID through test and handover unless the site approves renumbering.

Site acceptance log

Before testing, agree the reference instrument, allowable offset and observation time with facilities and IT. Use the log for each clock.

CLOCK	SWITCH / PORT	OFFSET	PASS / FAIL
CL-01			
CL-02			
CL-03			
CL-04			
CL-05			
CL-06			
CL-07			
CL-08			
CL-09			
CL-10			

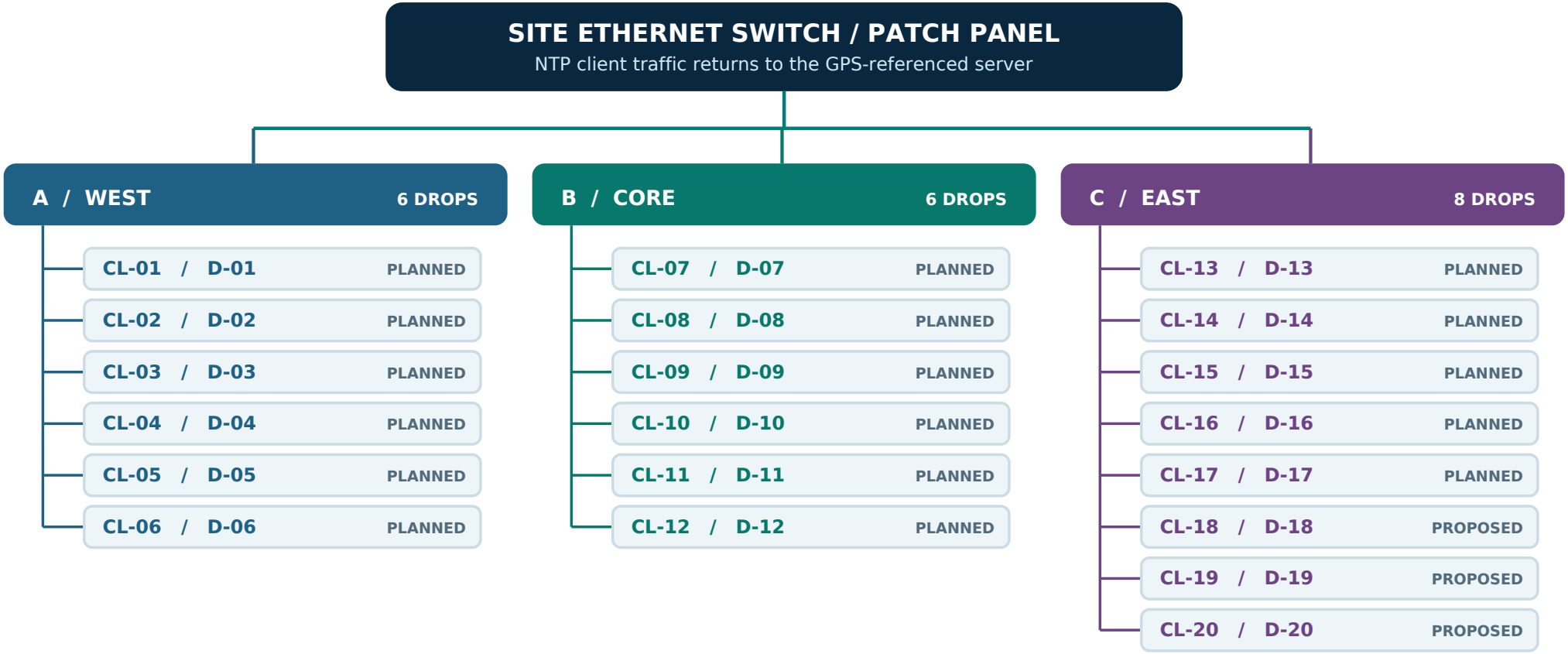
CLOCK	SWITCH / PORT	OFFSET	PASS / FAIL
CL-11			
CL-12			
CL-13			
CL-14			
CL-15			
CL-16			
CL-17			
CL-18			
CL-19			
CL-20			

SITE SIGN-OFF

Record test date, reference and acceptance tolerance; attach each exception, corrective action and retest. Record GPS/NTP status before and after the agreed outage and recovery checks.

Individual connections for all 20 clocks

Each clock has a dedicated Ethernet drop to the site switch or patch panel and a local AC supply.



SEPARATE LOCAL POWER

All branches are data-only. Each HCE-LS100 also needs an approved local AC connection. Verify port assignment, routes and power circuits at survey.