



Company Profile

Network
Synchronization
solutions



■ PolyNet – Network Synchronization solutions

Telecommunications network operators & service providers are challenged on many fronts to find common frequency, phase & time reference solutions for their entire network. There is a growing consumer demand for real time services and the downloading & streaming of video content. Operators are transitioning from 4G to 5G technology to meet increased demand for broadband and using Ethernet based IP backhaul which can carry both time & frequency synchronization. The need for both phase & time and frequency synchronization is becoming more and more critical in the race to provide ever faster communications.

- Based in Budapest, Hungary, PolyNet operates with an excellent skilled talent pool to draw from
- The company began more than 25 years ago as a developer and manufacturer of specialist synchronization equipment and now offers a full suite of services tailored to clients' needs
- With PolyNet synchronization solutions the telecom operators benefit network performance improvement and better user experience in many ways. KPIs affected by synchronization quality: Voice & Data Service Availability, Data Throughput, Latency, Handover Success Rate, Call Success Rate, Call Drop Rate, IP Packet Delay Variation and Audio Call Voice Quality
- Our real strength is in the technical expertise of the PolyNet team, but the value added comes from the personal relations, established with our clients, which allows PolyNet to provide flexible, tailored and turnkey solutions, often in some of the more challenging locations and environments around the world
- Are you ready for 5G? Our PTP Grandmaster clock is a world class product with the best Client/User price. PolyNet is a fully independent company, not linked with any vendor or operator and can work with or use equipment from any other supplier
- We always provide quick response time and personal service that clients tell us is critical to them and often missing with our competitors
- Our specialized laboratory is able to test any telco equipment's synchronization compliance & simulate 1000's of PTP clients which is a real advantage over our competitors
- Because we design and build our own equipment, we have deep technical knowledge and more than 25 year experience which allows us to be a superior synchronization service provider
- More than 100 installed synchronization systems in Africa and 30+ in Europe

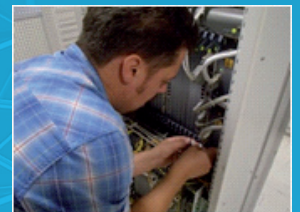
■ Our product range:

- PTPGM 1010 Grandmaster Clock
- PTPGM 1009 Grandmaster Clock
- Ptest Wander Analyzer
- NTP Server
- E1 Splitter



■ Services offered include:

- Network Synchronization Training and Workshop (English, French and Hungarian languages)
- Network analysis & optimization surveys (Synchronization Audit)
- Synchronization network planning and consulting
- Planning, installing & commissioning of hardware
- Ongoing User support: help desk, support synch network, spare parts management



■ Selected client references:

Safaricom Kenya
Vodafone Malta
Botswana Telecom Bofinet
TelOne Zimbabwe
Econet Zimbabwe
MTN Cameroon

MTN Congo
MTN Uganda
MTN Ivory Coast
Moov Ivory Coast
Vodacom Lesotho
GTS Romania

Invitech Hungary
ELMÜ – PowerCo
GTS Hungary
Vodafone Hungary
T-Mobile Hungary
Telenor Hungary

■ Industry Overview & Analysis

- Demand is growing for real time services & the downloading and streaming of video
- Network operators are increasingly migrating to Ethernet based IP backhaul which can carry both time & frequency synchronization
- 5G networks appear in many countries with TDD technology, which require the highly accurate Time synchronization with PTP protocol.
- Time critical Ethernet is now needed not just for mobile backhaul, but also for the new IoT (Internet of Things) where potentially thousands of sensors are interconnected to provide data on many things

■ Synchronization can be achieved with:

- Synchronous Ethernet: frequency sync solution. Widely implemented in Ethernet telco devices & networks especially for mobile backhaul
- IEEE 1588 (definition released in 2008): both frequency (G.8265.1) & phase/time (G.8275.1 and 8275.2) sync. PTP sync messages are carried from a PTP master (grandmaster) to a PTP slave
- Network Time Protocol (NTP): traditional version for packet-layer frequency/time sync
- GPS/GNSS (GPS, GLONASS GALILEO, BEIDOU, QZSS): need outside antennas with clear sight of satellites

■ NTP vs PTP – NTP can suffer from latency (timing) issues

- NTP Invented in the 1980's and now widely used around the world
- PTP invented many years later and uses transparent and boundary clocks in switches or routers to compensate for switching delay processing
- PTP achieves much better accuracy than NTP, but requires special hardware

■ Centralized PRC's (primary reference clocks) replaced by many PRTC's

- 3G used PRC's. 5G networks need PRTC's (timing clocks)
- Time & frequency sync. is now needed rather than just frequency sync.
- PRTC's are smaller & can be widely distributed (e.g. edge master)

■ There are GPS/GNSS security concerns (possibility of jamming)

- Jamming and anti-jamming market growing significantly
- If GNSS fails, traditional time clocks hold over time depending on the oscillator used

Selected project references

Amongst many other projects PolyNet describes below some of its network synchronization project by listing the main characteristics of the delivered services and solutions. The below listed references represent different telecommunications networks with different service portfolio. The many years of errorless operation of our synchronization systems proves the validity of the applied planning principles.

Safaricom Kenya – since 2005

Project objectives: Turnkey nationwide network synchronization project covering 12 major network nodes. The timing hubs are located the main and local MSC stations MGW stations, sync regenerators for long links, GPS based backup sources for bus topology links.

Project started: 2005, continued and completed by sync network upgrades, extensions and renewal in 2016. The synchronization network has been extended with a PTPGM1009 PTP Grandmaster server in 2019. The SLA is in place since the first implementation project.

Provided services: Complete synchronization network planning, network synchronization training for designers and O&M staff, training for synchronization quality measurement.

Vodafone Hungary – since 2016

Project objectives: Implementing a new synchronization system with IEEE 8275.1 Time Sync capable PTP Grandmasters. The timing hubs are located at four the main MSC/MGW stations.



■ **Botswana Telecommunications Corporation (BTC & beMOBILE) - 2012**

Project objectives: Turnkey nationwide network synchronization project for implementing a new synchronization system. The timing hubs were implemented at 9 main and local MSC/MGW stations, sync regenerators for long links; GPS based backup sources for bus topology links.

Sync network upgrade: 2018

The sync network has been expanded with 9 units of PTPGM1010 PTP Grandmaster Server in 2018.

Provided services: Network synchronization audit, complete synchronization network planning, network synchronization training and workshop for designers and O&M staff.

■ **Econet Zimbabwe – since 2009**

Project objectives: Turnkey nationwide network synchronization project covering 3 major network stations. The timing hubs are located the main and local MSC stations MGW stations.

Project successfully completed in 2009. SLA is in place since the first project implementation.

Provided services: Network Synchronization Audit and NTP Quality measurements, Network Synchronization Training for designers and O&M staff, sync system installation.

■ **Vodafone Malta - since 2009**

Project objectives: Turnkey nationwide network synchronization project covering 2 key network nodes. The timing hubs are located the main and local MSC and RNC stations.

Project successfully completed in 2009. SLA is in place since the first project implementation.

Provided services: Network Synchronization Audit, Network Synchronization Training for designers and O&M staff, sync system installation, Sync System Remote Monitoring service.

■ **TelOne Zimbabwe – since 2014**

Project objectives: Turnkey nationwide network synchronization project. The timing sources are located at the main and regional switching centers and network hubs.

Provided services: Network Synchronization Audit, Network Synchronization Training for designers and O&M staff, sync system installation.

■ MTN Uganda – since 2010

Project objectives: Turnkey nationwide network synchronization project for implementing a new synchronization. The timing hubs were located the main and local MSC/MGW stations, sync regenerators for long links, GPS based backup sources for bus topology links.

Project completed: 2010 SLA is in place since the first project implementation.

Sync network upgrade: 2018/2019

The sync network has been expanded with 8 units of PTPGM1010 PTP Grandmaster Server in 2018.

Provided services: Network Synchronization Audit, Complete synchronization network planning, network synchronization training and workshop for designers and O&M staff and training for synchronization quality measurement.

■ VodaCom Lesotho – since 2010

Project objectives: Turnkey nationwide network synchronization project for implementing a new synchronization system. The timing hubs were located the main and local MSC/MGW stations.

Project completed: 2010 SLA is in place since the first project implementation.

Provided services: Complete synchronization network planning, network synchronization training and workshop for designers and O&M staff and training for synchronization quality measurement.

■ Bofinet - 2018

Project objectives: Turnkey nationwide network synchronization project for implementing a new synchronization system based on PTPGM1010 multiservice clocks.

Project completed: June 2018

Provided services: Complete synchronization network planning, network synchronization training and workshop for designers and O&M staff, and hands-on course for synchronization quality measurement.

Delivered synchronization network elements: 10 x PTPGM1010 multiservice PTP Grandmaster servers with GNSS receivers, Ptest 1G Synchronization Analyzer instrument and implementation of ClockView network management system.



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