

Easy Time Synchronization Evaluation Over Broadcast Networks

Network Master Pro MT1000A

10G Multirate Module MU100010A

100G Multirate Module MU100011A

High Performance GPS Disciplined Oscillator MU100090A

With the start of 4K/8K TV programming, broadcast networks have also entered the era of large-capacity communications and are transitioning from SDI interfaces to IP networks to facilitate huge data traffic. IP networks have various benefits, such as long-distance transmissions, reduction of cabling, and use of lower cost network switches. However, there is an issue they don't support strict time synchronization among network equipment in general.

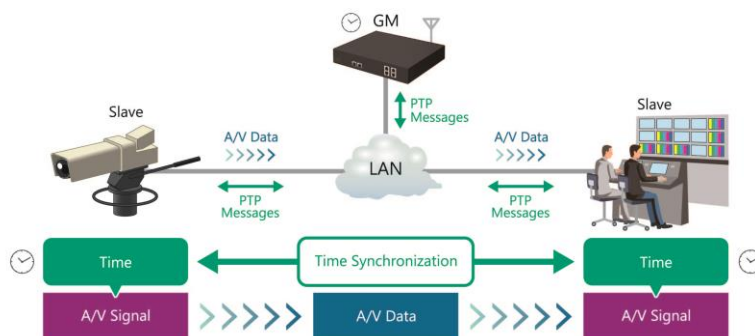
There must be no dropped programming or lost synchronization, such as when switching between cameras and relays at different remote broadcast locations A and B. IP networks achieve this time synchronization using the Precision Time Protocol (PTP).



Time Synchronization using PTP (SMPTE 2059-2)

The PTP is a protocol for distributing the time to each piece of equipment on the network from a Grand Master clock with the reference timing information. PTP can be customized to match the features of the applicable industrial field using a configuration called a Profile. The broadcast industry Profile is defined by SMPTE 2059-2, which defines the following reference items for basic time synchronization performance.

1. The maximum time error between any two slave clocks (TV cameras, etc.) is 1 μ s.
2. The Grand Master frequency accuracy must be within 5 ppm.
3. After connection to the PTP network, slave clocks must synchronize within 5 s.



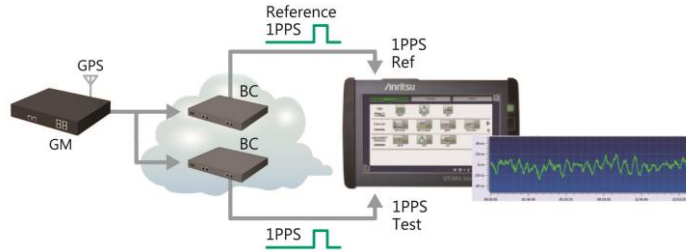
Broadcast Synchronization Method using IP Network

PTP Network Evaluation

Network SMPTE2059-2 compliance can be evaluated using the Network Master Pro MT1000A.

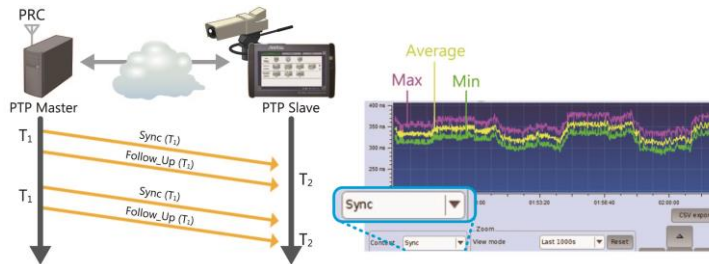
■ Evaluate Time Error Between Any Two Slave Clocks

The time error is evaluated by comparing the 1 PPS phases output from two boundary clocks at the network edge.



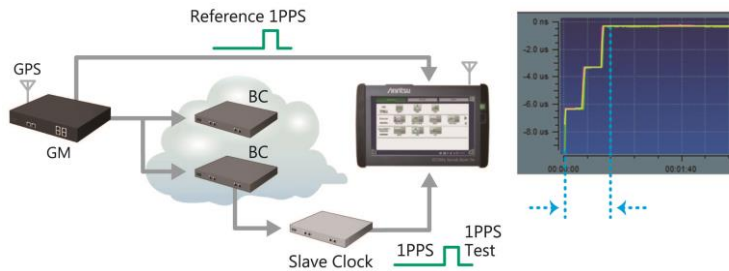
■ Evaluate Grand Master Frequency Accuracy

Variability in the PTP message propagation delay (PDV) is a key factor causing degraded frequency synchronization accuracy at the Slave clock. The frequency accuracy is evaluated by measuring the PDV based on the timestamp in the Sync message.



■ Measure Time Until Slave Clock Synchronizes after Connection to PTP Network

The time until the Slave clock stabilizes after connection to the PTP network is confirmed by a graphical plot.



Multicast Network Time Synchronization

The MT1000A can measure the PTP after joining a multicast network using IGMP/MLD.

