

# Time Synchronization in Noise Analyzer Testing



# **Background**

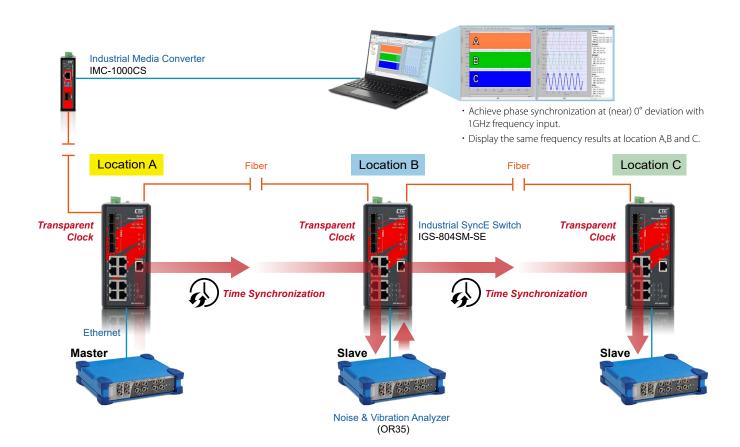
This product solution is based on a testing that was carried out by one of our partners who needed to precisely synchronize OROS' OR35 noise analyzers over the Ethernet network. These noise analyzers were located in different locations; therefore, our partner aimed to seek a way to have these analyzers to start and stop at the same time. After receiving the needs of our partner and having several discussions with our partner, CTC Union identified the following considerations that should be taken into account in our partner's testing.

#### **Considerations**

- In our partner's networking design, These noise analyzers are designed to be placed in different locations. Therefore, the proposed solution needs to cope with constraints of long distance connection between the management computer and each device.
- This testing requires stable and reliable fiber optic and Ethernet transmission over the network.
- Each noise analyzer needs to start and stop at the precise time. Therefore, time synchronization is the key to the success of this noise testing.

#### Network Architecture

In this product solution, our partner used a daisy chain (line) network. In order to extend transmission distance from one location to another, IGS-804SM-SE switches were suggested to be used to connect devices in different locations via fiber optic connection. To deal with time synchronization concerns, IGS-804SM-SE switches, equipped with Synchronization Ethernet (SyncE) and IEEE 1588 protocols, also played an important role in facilitating phase and frequency synchronization of each noise analyzer in this testing network.



## **Solutions & Benefits**

In this product solution, the partner reviewed an array of products that were available on the market and finally decided to use the networking product, IGS-804SM-SE, designed and manufactured by CTC Union. The partner indicated that the product provided by CTC Union was chosen because of their excellent performance at an affordable price, let alone they can provide solutions to the above mentioned considerations. Benefits of the chosen product are provided below.

- **Suitable for Harsh Conditions.** Industrial grade products from CTC Union can function normally in harsh and extreme conditions no matter the operating temperature is as low as -40°C or as high as 75°C.
- Against Environment Influences. The chosen products can be placed in the environment where surge, turbulences and shocks occur frequently or can undergo tough lab tests. The industrial grade products from CTC Union achieve EMC, E50121-4, HiPot and Surge protection certification which protect devices from damage due to sudden surges and constant shocks, vibration or electromagnetic interference.
- Optimize the Implementation of Time Synchronization. The chosen product supports both IEEE1588v2 and Synchronization Ethernet (SyncE). In this case study, the former is used to synchronize between each OR35 analyzer at the initial step and the latter is able to maintain time synchronization based on the physical layer. Both synchronization protocols can achieve highly precise distribution of phase and frequency over the network.

### **Results & Conclusions**

The product from CTC Union, IGS-804SM-SE, used in the noise testing aims to provide stable transmissions and viable solutions for distributing unified timing over the network. This case study also takes advantage of both SyncE frequency accuracy and IEEE 1588 phase accuracy to achieve time alignment. As shown in the figures below, the results of OR35 analyzers via IGS-804SM-SE switches can achieve phase synchronization at (near) 0 degree deviation with 1GHz frequency input (Figure 1). Moreover, while phase and frequency are synchronized over the network, the results display the same frequency results (Figure 2).

To conclude, IGS-804SM-SE switches play an important role in extending transmission distance via fiber optic cables and in precisely aligning phase and frequency between devices and transferring accurate time reference. This case study also demonstrates that IGS-804SM-SE is not only preferred in offering reliable transmissions over packet networks but also can be applied in more specialized applications such as noise or vibration testing.



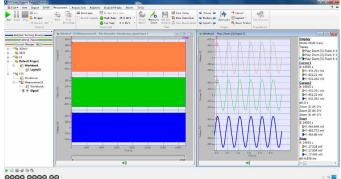


Figure 2

**Recommended Products** 



IGS-804SM-SE Industrial SyncE Switch



IGS-1608SM-SE Industrial SyncE Switch



IMC-1000CS Industrial Media Converter

• The specification and pictures are subject to change without notice.

