MEDIA LINKS®
Media Defined Networking®

Application ideally suited for:

- Networks where there is limited available radio spectrum
- Regional broadcasts where low-cost localized programming is required
- SFN networks where GPS independence is needed for increased security, control and resiliencel
- Existing SFN networks that need to extend coverage and increase efficiency

Advantages of SFN Networks:

- Excellent spectral efficiency (low BW consumption)
- Lower energy consumption (greater power efficiency)
- More homogenous field strength for better reception & user experience
- Better suited for Digital Video Broadcast to mobile Handsets
- Better assurance for indoor reception versus MFN (Multi Frequency Networks)

Standards and specification

- ST 2022-2 Standards based transmission
- ST 2022-7 Seamless Protection Switching and Auto Protection
- ST 2022-5 Forward Error Correction
- ETSI TR 101-290 TS compliant monitoring
- Two 10GbE/1GbE optical trunk interfaces
- PTP (IEEE1588 V2) for Advanced Sync Functions
- 1 PPS & 10Mhz Synchronization Outputs
- BC over 10GbE interfaces for external interconnection
- On-board provisioning interface
- 1RU, Half-rack width; 2 units per standard 19" rack
- 2.7Kg / 5.95lbs, 108VA power consumption
- Redundant, dual power supply support

Related Products

*MDP3000 Series of compact, portable
IP Media Gateways
ProMD EMS Software*

APPLICATION NOTE

SFN Network Synchronization with Media Links' MDP3020

For an overall more secure, resilient and ultimately less expensive SFN network. The standards-based Media Links MDP3020 SFN Edition carrying PTP (Precision Timing Protocol) synchronization packets over terrestrial IP networks provides an excellent alternative to conventional GPS receivers

PTP GRAND MASTER
IEEE1588 V2
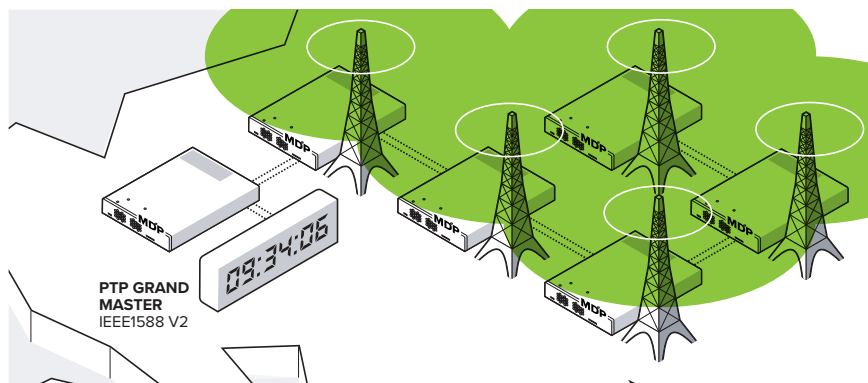
Single Frequency Networks (SFN) are multi-transmitter networks that combine to cover an area with the same frequency and transmit the same information for an extended footprint of coverage without the need to use additional frequencies. This is SFN's big advantage.

The main characteristic of SFN networks is that they operate with low(er) powered transmitters for more uniform field strength. All transmitters are perfectly synchronized, operate at the same frequency, and with the same digital information. Conventional SFN networks use Global Positioning System (GPS) receivers to synchronize all transmitting sites.

Media Links' MDP3020 SFN Edition provides synchronization via terrestrial IP networks using the 'Precision Time Protocol' (IEEE1588 V2) standard. This results in less expensive, more reliable operation and delivers a far greater level of security and control when compared to GPS based SFN networks. Additional benefits include full-scale network management, onboard redundancy, and the ability to more easily scale with additional transmitters (and therefore network size) should needs change.

Trade-off's …
## what's great and not so great about Single Frequency Networks

SFN networks work well and use modulation schemes that are immune to, and resilient against multipath reception of the same signal (i.e. echoes). So, in a SFN network where the same signal is transmitted by multiple transmitters with resultant signal overlap, the weaker of the same frequency signals are considered an 'echo' and rejected by the receiver, leaving the strongest signal for maximum reception. The big hurdle with SFN networks is the need to synchronize all the transmitters, traditionally with GPS receivers, and this translates into a significant additional cost.


**Traditional SFN
w/ GPS synchronization
and duplicated hardware
for redundancy**
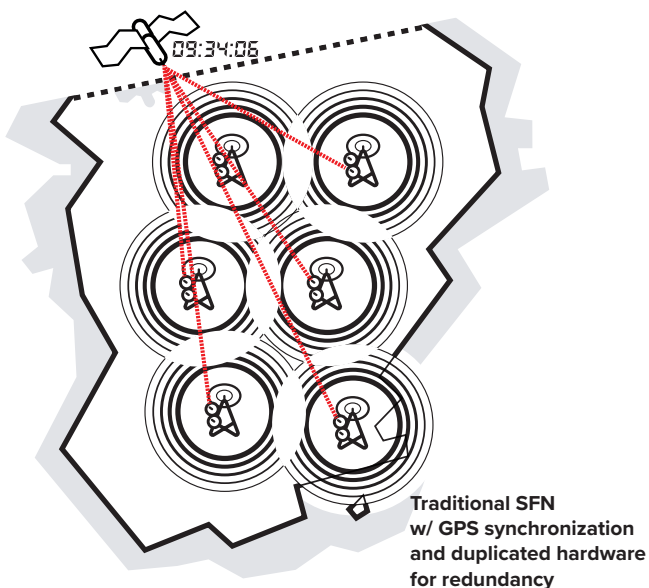
The current MORE COSTLY and RISKIER way of SFN Synchronization
Typically, GPS Receivers are used on each transmitter site to generate the clocking signals for the synchronization of the transmitters

🚫 On each transmitter a GPS receiver is needed, a second one for redundancy

🚫 Additional installation effort is required for the GPS antennas, receivers and cabling

🚫 GPS receivers can be jammed, willfully or by accident

🚫 The GPS system itself is not in the hands of the network provider. It may not even be based in the same country, region or continent

🚫 Any distortion/outage on the GPS can result in a major disturbance of the whole SFN network
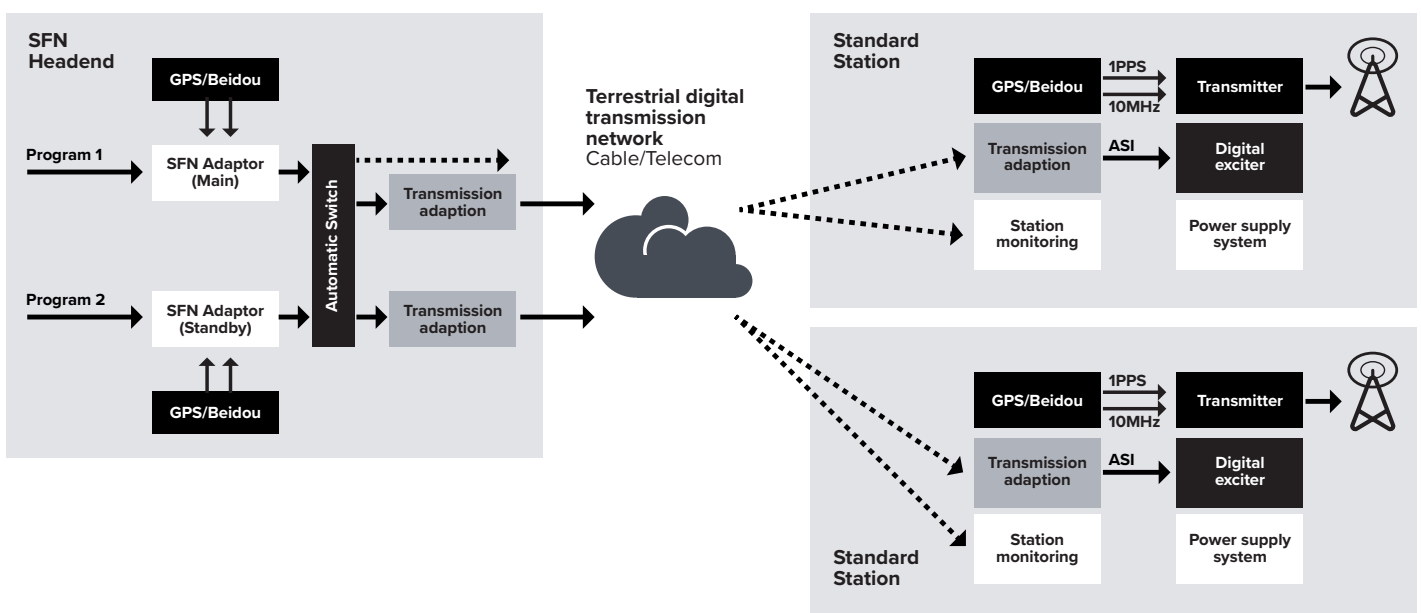
The GPS alternative, a less costly and more robust/secure solution using the Media Links MDP3020 SFN Edition – IP Media Gateway
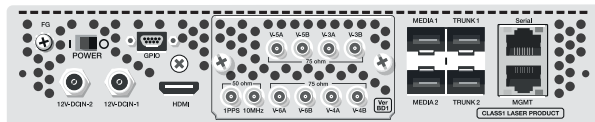
Introducing the Media Links MDP3020 SFN Edition
A terrestrial IP network is implemented using the 'Precision Time Protocol'* (IEEE1588 V2) for time synchronization of each transmitter site in the SFN network.

The PTP packets can be provided from single or multiple ingests within the network. The necessary 1PPS‡ and 10MHz signals can be derived from the receiving MDP3020 SFN Media Gateways to provide the relevant clocking information for each of the transmitters.

* PTP is defined by the IEEE 1588-2008 standard
‡ 1PPS is defined as 1 pulse per second

ST 2022-2 Standards based transmission

ST 2022-7 Protection Switching and Auto Protection

ST 2022-5 Forward Error Correction

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Using the Media Links MDP3020 SFN IP Media Gateway

1 No changes to the existing network are needed (assuming the tower sites are already connected to an IP network for delivery of the DVB-T/DAB transport streams)

2 By enabling the IP network to PTP, the same network can be used to transport the 1PPS and 10MHz synchronization signals to the towers

3 In addition, the same MDP3020 Media Gateways can be used to encapsulate one or multiple ASI Transport Streams over IP into DVB-T2 Base-band frames. The resulting T2-base multiplex uses the T2-MI (T2-Modulator Interface) protocol through IP. At the same time, the MDP3020 can transport the 1PPS and 10MHz signals for synchronization

### Advantages of the integrated Media Links MDP3020 SFN Edition solution

✓ Uses the same existing IP network for delivery of TS streams and synchronization

✓ Independence from external GPS sources w/ no additional GPS antennas & receivers

✓ Capability of IP network 1+1 redundancy for the TS streams and synchronization

✓ End to End Network Management with Media Links' ProMD-EMS

✓ Overall lower network cost with greater service assurance and robustness

Single Frequency Network w/ IP synchronization, resilience, and built-in redundancy
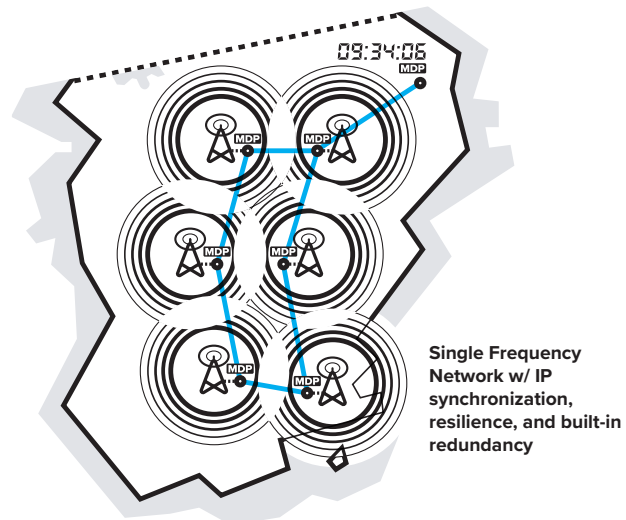
Synchronization using the Media Links MDP3020 SFN Edition
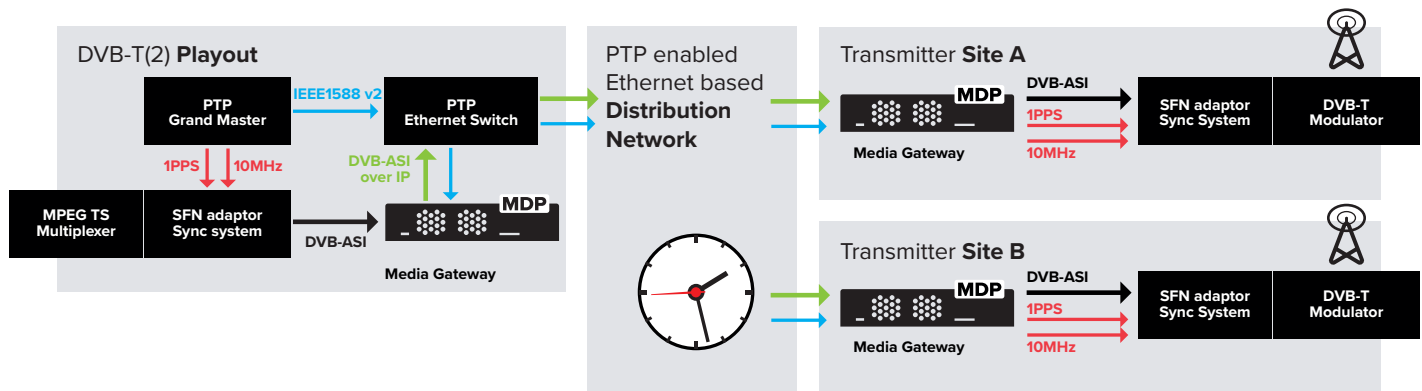
Media Links MDP3020 SFN Edition in a redundant 1+1 Configuration

Legend:
- DVB-ASI over IP
- Redundant ASI over API
- PTP (IEE1588 v2)
- Redundant PTP
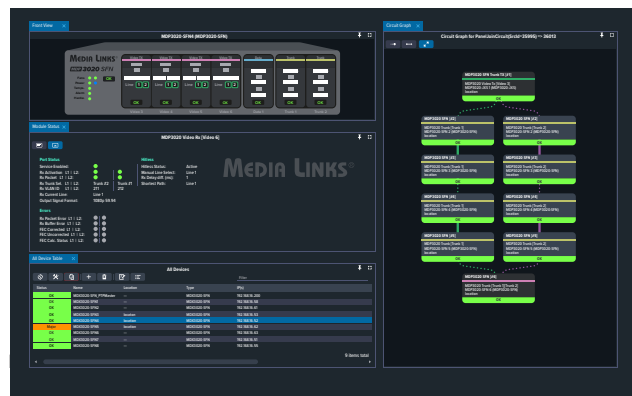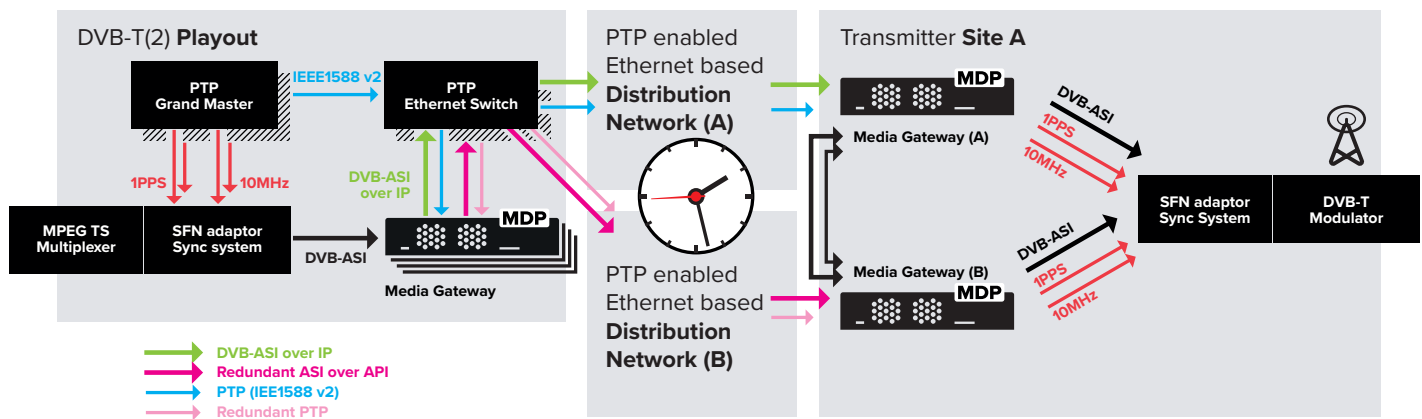
SFN Network Management using Media Links' ProMD-EMS Enhanced Management System

MDP3020 can also be managed with Media Links' ProMD-EMS

- Network Configuration and Fault Management
- Stream Flow Management
- Device and Topology View
- Statistics

3rd party devices can additionally be added for a comprehensive end-to-end remote monitoring and control software solution.