VIDI® SYSTEMS

White Paper - Synchronization on SFN Networks

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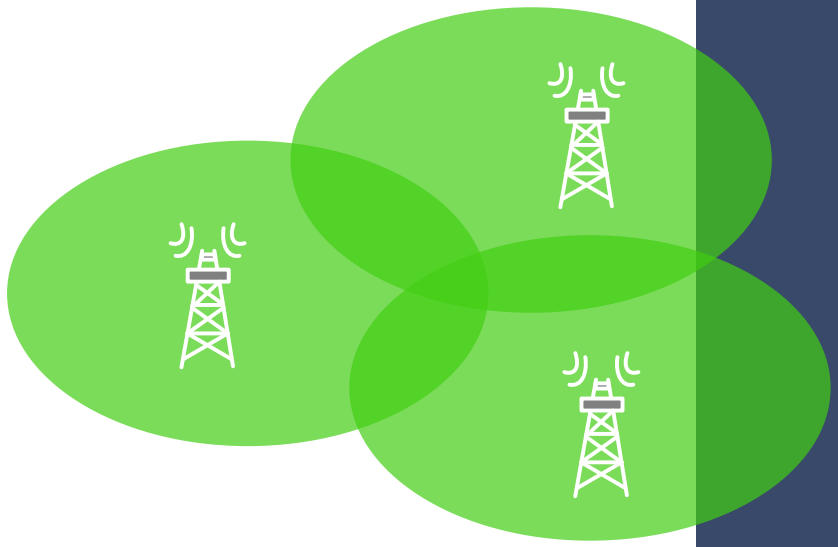
Single Frequency Networks for DVB-T/ DAB Broadcast Transmission

Traditional Broadcast transmitters use different frequencies for the same program if they are placed within a geographical closeness, whereas DVB-T/DAB are designed as Single Frequency Networks.

As a consequence the impact of frequential interferences needs to be compensated.

Hence the exact same information on exact the same frequencies need to be broadcasted simultaneously (phase coupled) on all transmitters.



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The “traditional” way of Synchronization

Usually GPS Receivers are used on each transmitter site to generate the clocking signals for the synchronization of the transmitters.

<u>But:</u>

- On each transmitter a GPS receiver is needed, a second one for redundancy.
- Additional installation effort for the GPS antennas, the receiver and cabling.
- GPS receivers can be jammed, willfully or by accident.
- The GPS System itself is not in hands of the network provider, even not in European hands.
- Any distortion or outage on the GPS can result in a major disturbance of the whole DVB-T/DAB network.

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Precision Time Protocol over IP for GPS independent timing

For time synchronization of each of the transmitters in the SFN domain by an terrestrial IP network, the Precision Time Protocol[1] can be used.

The PTP packets can be provided from single or multiple ingests within the network. The necessary 1PPS[2] and 10MHz signals can be derived from the receiving Media Gateways to provide the relevant clocking information for each of the transmitters.

1 PTP is definied in IEEE 1588-2008 standard
2 1PPS – 1 puls per second

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MDP3020 as Media Gateway

The tower sites are connected to an IP network for delivery of the DVB-T/DAB transport streams anyhow.

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

By using the MDP3020, the same Media Gateway can be used to encapsulate one or several ASI Transport Streams over IP into DVB-T2 BaseBand 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.

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Advantages of the integrated MDP3020 solution

Advantages of the integrated solution:

- Using the same existing IP network for the delivery of the TS streams and the synchronization.
- Protection against jamming of the GPS signals.
- Independency form the external GPS source.
- No additional GPS antennas and receivers on each transmitter site.
- Possibility for 1+1 redundancy for the TS streams and the synchronization.
- End to End Network Management by VIDI NMS.

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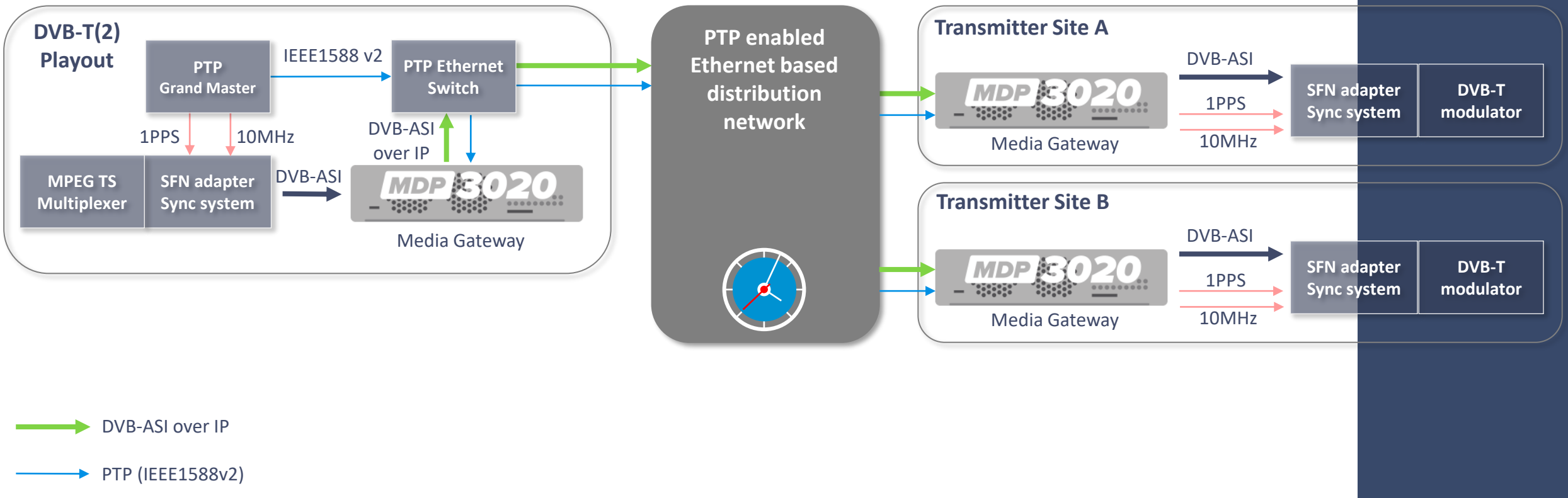
System Overview, using Media Links MDP3020



DVB-ASI over IP

PTP (IEEE1588v2)

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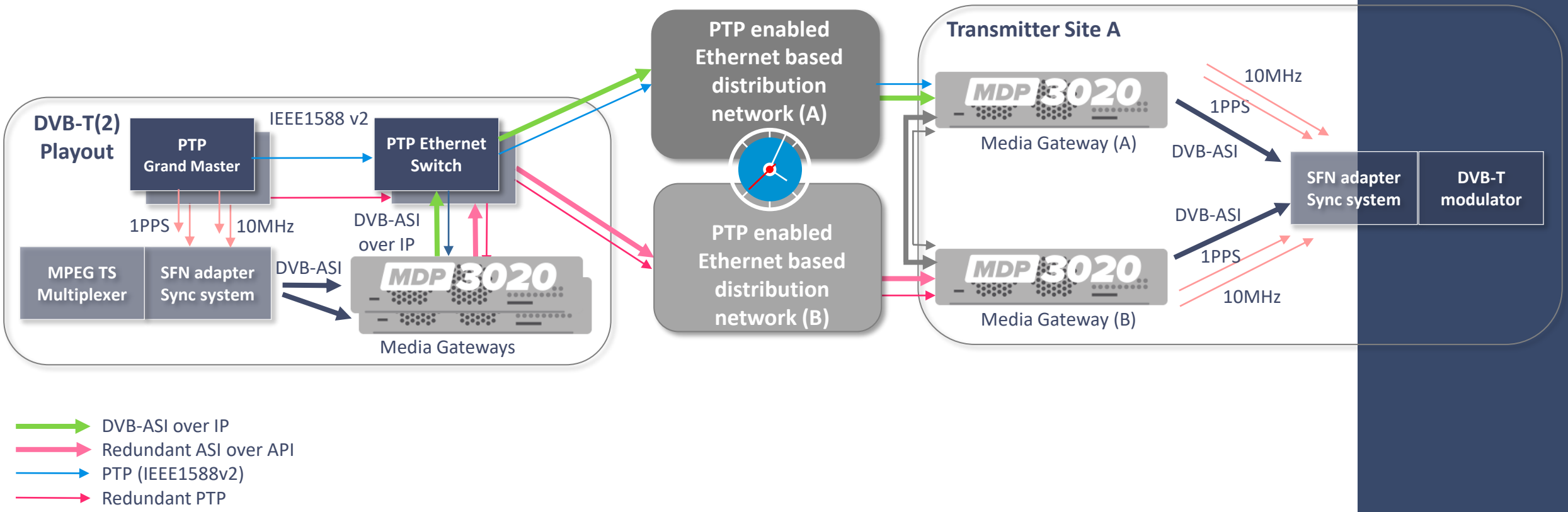
System Overview (1+1 Setup)



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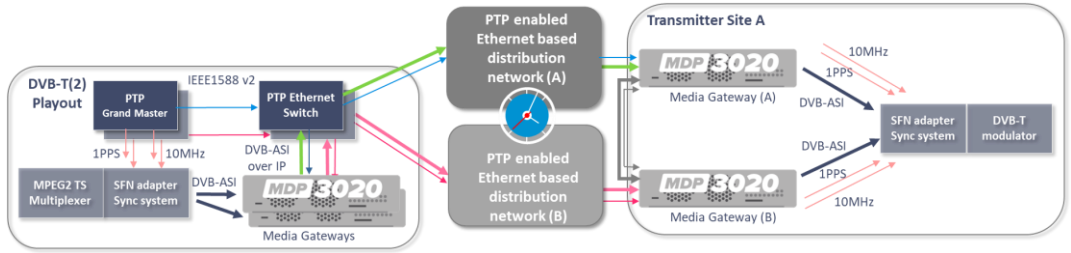
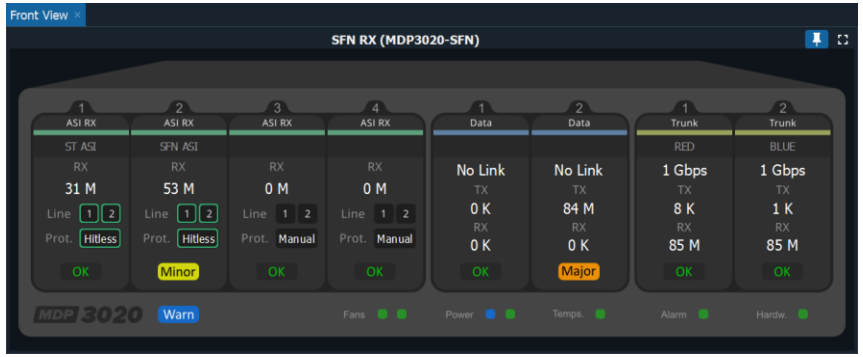
How to manage



- The MDP 3020 is Fully integrated into the VIDI /NMS
  - Configuration and Fault Management
  - Flow Management
  - Device and Topology View
  - Statistics
- 3rd party devices can be added for a real end to end monitoring and control solution.



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