



## Inspect 2110

As Broadcast media networks transition from SDI to IP, engineers and operators lose visibility of the high volume of activity on their network and the continual changes to their content. Inspect 2110 provides the required visibility by monitoring content and key parameters on ST 2110 and ST 2022-6 networks. It offers monitoring by exception to alert users with warnings and alarms. Inspect 2110 is an essential and trusted tool for Engineering, System Integration, and Operations teams because it monitors your networks in the background 24/7.



## Feature Benefits



Check that PTP synchronization is correct and operational



Confirm video, audio, and data streams are present, correct and compliant to the standards



Ensure redundant video and audio streams the same, in sync and healthy



View network traffic and identify QoS trends



Click to launch video stream on PRISM for detailed analysis

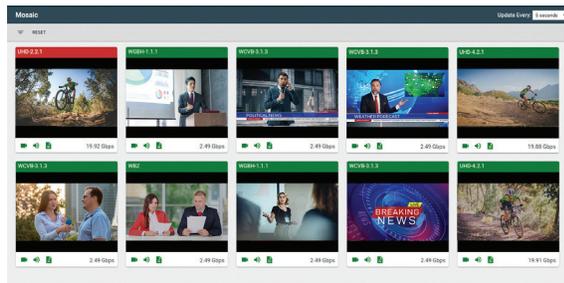
Interface	Last Updated	Locked	Domain	Master ID	Grandmaster ID	Anteance Rate	Sync Rate	Request Rate	Response Rate
eth0	Aug 04 15:48:00	X	110	0800119a22f77	0800119a22f77	4	0	0	0
eth2	Aug 04 10:58:26	✓	110	0800119a22f77	0800119a22f77	4	0	0	0

## Ensuring your PTP Timing is stable

PTP timing and synchronization are critical for IP media networks. When there is a problem, it requires rapid response and expert focus. While vital to the operational integrity of the system, the messages and protocol required to setup and manage PTP are almost invisible to those working with, and processing content. Inspect 2110 will monitor your PTP traffic 24/7/365 and instantly provides notifications whenever a significant event occurs on your PTP system. Inspect 2110 collects PTP performance metrics and reports changes to the synchronization system such as Grandmaster ID or changes in message rates. Inspect 2110 provides straightforward automated detection of PTP issues saving time and reducing synchronization errors.

## Monitoring by Exception

In today's facilities, engineering, creative, and operations staff are under constant time and cost pressure. They are required to get their jobs done quickly and efficiently with as little disruption as possible. Inspect 2110 monitors by exception, working quietly in the background and interrupting key personnel only when there is a problem. If all is well, they can continue to perform their day-to-day duties, secure in the knowledge that Inspect 2110 is monitoring their content and network. Inspect 2110 highlights problem streams via thumbnails with status icons as well as mouse-over alert messages and provides a direct link to deep diagnostics if required. Let Inspect 2110 take the on the monitoring load, It's simple, clean, and efficient.



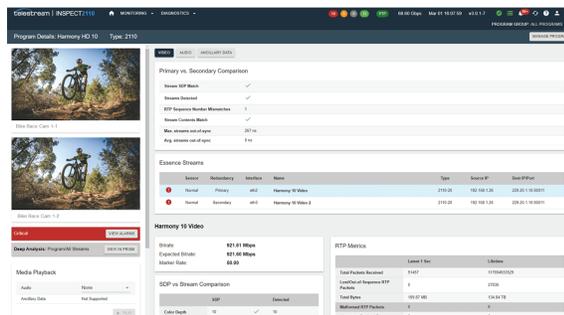
SDP vs Stream Comparison		
	SDP	Detected
Color Depth	10	10
Colorimetry	BT2020	Not Detectable by Probe
Frame Rate	59.94	48.89
Height	2160	2160
Interlace	No	No
PAR	1:1	1:1
PM	2110GPM	Not Detectable by Probe
Range	NARROW	Not Detectable by Probe
Sampling	YCSC4:2:2	YCSC4:2:2
Segmented	No	Not Detectable by Probe

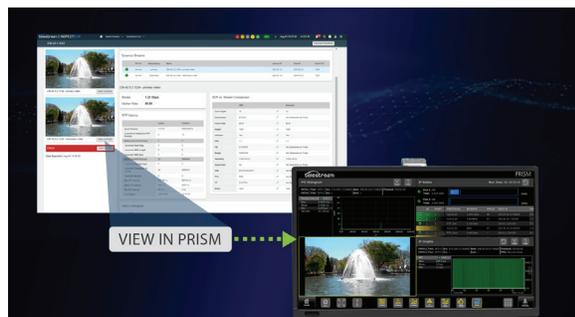
## Validating content not just gathering statistics

With the variety and combinations of video, audio, and data streams it is important to ensure that what is on your network is what's supposed to be there. Inspect 2110 will verify that your SDP files are correct and will look at your content by checking formats, resolutions, bitrates, and frame rates. This ensures that these streams are correct, contain valid content, and are error-free when compared to the SDP file. Inspect 2110 also reports on a wide range of standard IP network statistics that other systems depend on to report issues by inference. Inspect 2110 finds real problems in real content.

## Redundancy validation

ST 2022-7 and redundancy provide peace of mind to those responsible for the reliable delivery of content. It is vital to know that, should you need to use packets from your backup network, there will be no problems. Inspect 2110 monitors both your primary and secondary streams to ensure that they are present, they are the same, and that neither is degrading to a point where a switch would cause a catastrophic system failure. Operators can easily view redundant stream thumbnails and comparisons and obtain alerts in the case of mismatch issues.





## One click to PRISM deep diagnostics

Inspect 2110 can be easily scaled up to monitor large media networks and is designed to simultaneously look at a wide range of signals and variables. When alarms or errors occur, Engineers need access to in-depth analysis tools to allow them to remedy issues quickly. With one click of the “View in PRISM” button on the Inspect 2110 UI, Engineers can automatically select, launch, and configure any Telestream PRISM on the network to perform deep analysis on problem ST 2110/2022-6 streams. An unmatched combination of large-scale monitoring and in-depth analysis from a single company.

## High Performance, Flexibility, and Easy Integration

Using simple software upgrades Inspect 2110 can be configured to monitor bandwidths up to 200G. Additional software options can be applied to tailor the instrument to specific applications whether that is monitoring contribution links, checking what is leaving the OB truck, or ensuring that studio cameras and mics are operating correctly. Systems Engineers will appreciate the easy integration with the rest of their IP media infrastructure through NMOS compatibility and an “API-first” design ideal for automation and other third-party software integration.



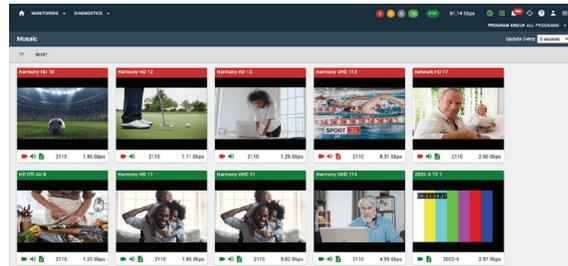
## Ready to Learn More?

Inspect 2110 is the latest addition to the Telestream IP Media monitoring family of products. Together with the PRISM family of hybrid IP/SDI waveform monitors, Telestream has the ideal solution for ensuring the quality of your IP Media streams for broadcast operation and network distribution. To learn more, or to get a demo, click here: [Monitoring ST 2110 Networks Visibility, Test, and PTP Timing Solutions.](#)



## Mosaic

Provides a simple overview of your monitored audio, video and data essences that comprise your monitoring group. Using monitoring by exception helps operators and engineers quickly identify issues within the content of a Monitoring Group. Simple red/green indicators provide an alert to the user of potential issues, and they indicate the type of error detected giving more specific direction on the problem to be solved. Simply hovering over the red icon provides additional information on the type of error and clicking on the icon provides more detailed information to allow the user to investigate the problem.



## Monitoring Group Details

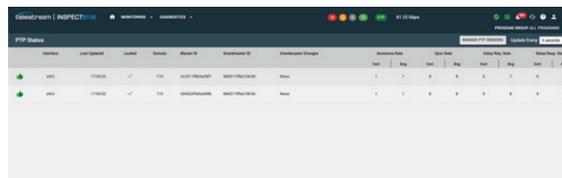
The Inspect 2110 Monitoring Group Details display provides a variety of information on the Video, Audio and Ancillary Data streams within that group. Thumbnails help identify the video content for the redundant ST 2022-7 streams allowing the user to check visually that both streams are identical and not mismatched. The primary versus secondary comparison provides checks on the streams for Content match, RTP sequence number mismatches, and measurements of out of sync deviations allowing the user to determine issues between the streams.

Red/green indicators allow the user to specifically identify the errors within the streams.

Checks on the essence payload and the bitrate of each stream help verify the type and presence of the stream for video, audio, or ancillary data.

## Precision Time Protocol Monitoring

Precision Time Protocol (PTP) is the foundation of synchronization within an IP Media network. Inspect 2110 continually monitors PTP on both primary and secondary networks providing information on the Grandmaster ID, message rates for announce, sync, delay request and delay response. The user can setup alarm templates for PTP to alert the user to a Domain Change, a Change in Grandmaster ID and select threshold for the various message rates.



SDP vs Stream Comparison

	SDP		Detected
Color Depth	10	✓	10
Colorimetry	BT2020	✓	Not Detectable by Probe
Frame Rate	59.94	✗	48.93
Height	2160	✓	2160
Interface	No	✓	No
PAR	1:1	✓	1:1
PM	2110GPM	✓	Not Detectable by Probe
Range	NARROW	✓	Not Detectable by Probe
Sampling	YCbCr-4:2:2	✓	YCbCr-4:2:2
Segmented	No	✓	Not Detectable by Probe
SSN	ST2110-20:2017	✓	Not Detectable by Probe
TCS	SDR	✓	Not Detectable by Probe
TP	2110TPN	✓	2110TPN
Width	3840	✓	3840

## SDP vs Stream Comparison

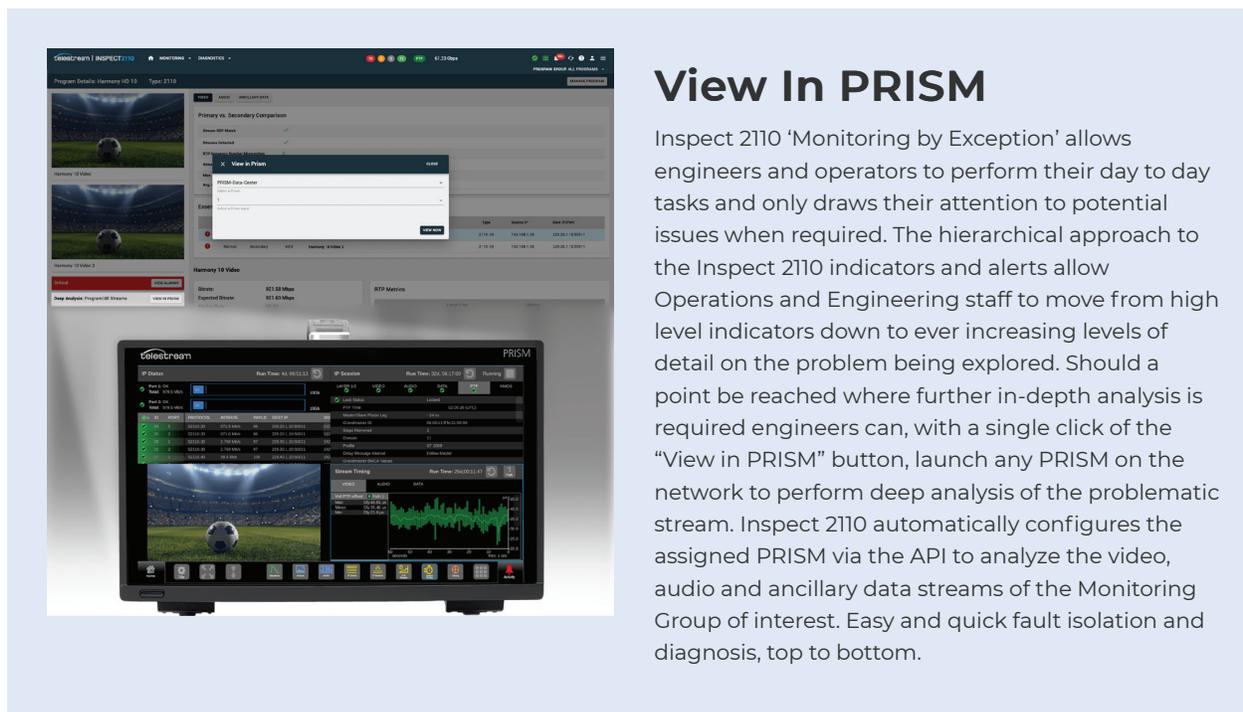
Within Inspect 2110 the Session Description Protocol (SDP) information is used to configure the video, audio and ancillary data essence information for the input configuration. In some cases, the information entered in the SDP may not match the actual video, audio or ancillary data content. Inspect 2110 can perform a comprehensive SDP to Stream content comparison to ensure that the actual content matches that described in the SDP. When differences are detected, easy to read checkmark indicators are used to highlight potential issues that need to be resolved. Inspect 2110 looks at the stream content and the SDP to ensure that the content that is on the media network is what is expected and ensures that it is correct.

## RTP Metrics

The Real Time Protocol (RTP) provides syntax on the sequence of the IP packets carrying the media payload. Inspect 2110 measures the total number of packets received and determines if packets have been lost or arrive out of sequence. Additionally, measurements are made on malformed RTP or ST2110 packets that have been received. The Packet Interval Time is also measured for mean, minimum and maximum values. These values can be plotted overtime in the metric chart to highlight overall network performance trends and to help predict potential future issues.

RTP Metrics

	Latest 1 Sec	Lifetime
<b>Total Packets Received</b>	876669	2322544278433
<b>Lost/Out-of-Sequence RTP Packets</b>	14	36584465
<b>Total Bytes</b>	1003.27 MB	2.48 PB
<b>Malformed RTP Packets</b>	13	25124964
Incorrect Payload Type	0	0
Incorrect Timestamp in Frame	13	25124964
Incorrect Version	0	0
<b>Malformed 2110 Packets</b>	0	0
Incorrect Field Flag	0	0
Incorrect SRD Length	0	0
Incorrect SRD Row	0	0
<b>PIT</b>		
Max PIT Interval	23206643 ns	189000329 ns
Mean PIT Interval	1126 ns	1126 ns
Min PIT Interval	57 ns	0 ns



## View In PRISM

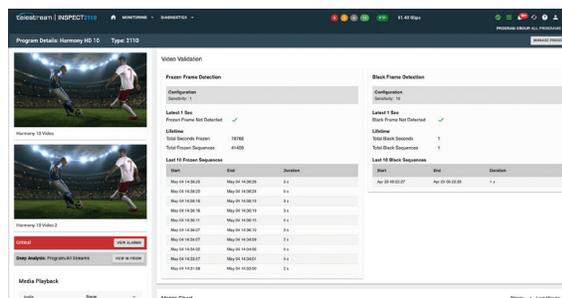
Inspect 2110 'Monitoring by Exception' allows engineers and operators to perform their day to day tasks and only draws their attention to potential issues when required. The hierarchical approach to the Inspect 2110 indicators and alerts allow Operations and Engineering staff to move from high level indicators down to ever increasing levels of detail on the problem being explored. Should a point be reached where further in-depth analysis is required engineers can, with a single click of the "View in PRISM" button, launch any PRISM on the network to perform deep analysis of the problematic stream. Inspect 2110 automatically configures the assigned PRISM via the API to analyze the video, audio and ancillary data streams of the Monitoring Group of interest. Easy and quick fault isolation and diagnosis, top to bottom.

## Video / Audio Validation and Compliance Monitoring

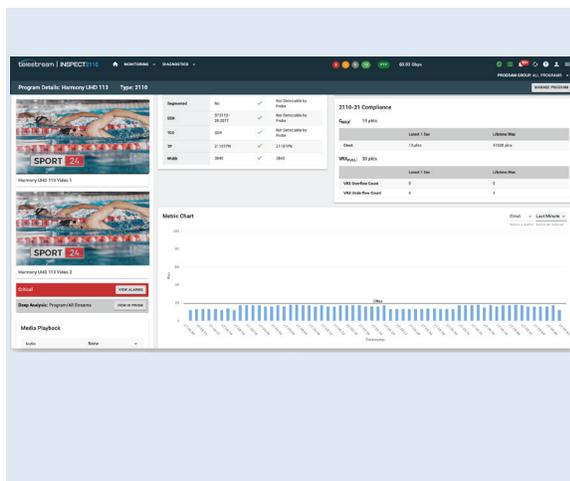
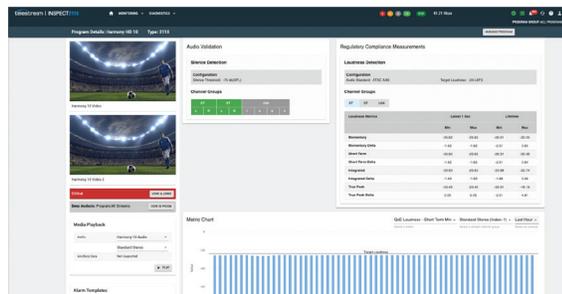
Inspect 2110 can provide audio and video validation for video and audio measurements. For instance, there are detection algorithms for black or frozen video frames and the user can setup a threshold for detection and can track these errors over time. For audio monitoring the Inspect 2110 can detect silence in any of the audio essences being monitored (option INS21-AVVAL is required for these audio/video validation metrics).

Red/green indicators allow the user to specifically identify the errors within the streams. A log provides indication of the last ten frozen or black sequences events detected and this can also be plotted graphically overtime.

The compliance monitoring packages measures the audio levels in the channels that are present in any of the audio essences that are being monitored. Loudness Detection can be performed on the audio channel groups to ATSC A/85 with Loudness metrics monitored over the last second and over the lifetime of the measurement. These loudness metrics can also be plotted over time for trend analysis.



To further validate the Monitoring Group, operators and engineers can decode the video and audio of a program to allow remote viewing of the content via a web browser. This allows the user to verify the video and audio content (option INS21-RVW is required).



## SMPTE 2110-21 Monitoring

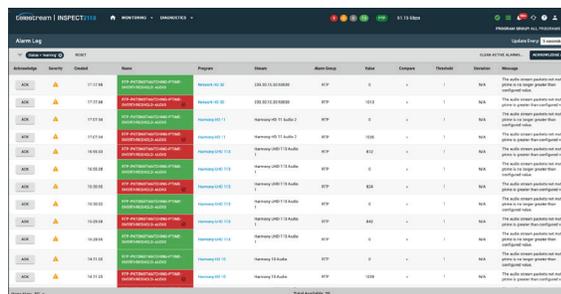
ST 2110-21 Standard for Professional Media Over Managed IP Networks: provides guidance on Traffic Shaping and Delivery Timing for Video. Specifically,  $C_{MAX}$  and  $C_{INST}$  for the network compatibility model of the sender and  $VRX_{FULL}$  for the virtual receiver buffer model. These measurements can be performed by Inspect 2110 and monitored within the metric chart over time.

## Alarm Templates & Logging

Inspect 2110 is capable of monitoring numerous metrics and parameters but they may not all be of equal important or relevant to the various system users. The use of alarm templates allows Engineer to customize what is monitored and logged. Users can determine logged items as Critical, Warnings or Informational with the ability to set thresholds and duration for when the alarm is triggered.

The list of alarms can be filtered to allow users to select parameters that are of specific interest to them. Inspect 2110 allows you to filter by Name, Status, Alarm Category, Monitoring Group, Active Alarms or Acknowledge alarms.

This ability to use templates and to filter the alarms allows Engineering and Operations to tailor the system to alert on only what is important to them. Customized monitoring by exception improves the efficiency of the Operations and Engineering team as they will only be disturbed when things that matter to them go wrong.



## Tech Specs

### Capacity

Monitor up to 180Gbps bandwidth across 1 or 2 25Gb/40Gb/100Gb Ethernet ports

### License

Based on maximum monitoring bandwidth:

- 50 Gb (25Gb per media port)
- 80 Gb (40Gb per media port)
- 180 Gb (90Gb per media port)

### Protocols

- ST2110-20
- ST2110-21
- ST2110-30
- ST2110-31
- ST2110-40
- ST2022-6 (no FEC)
- ST2022-7
- AMWA NMOS IS-04
- AMWA NMOS IS-05
- AMWA BCP 002-01

### PTP Timing

- PTP v2
- ST 2059-1

### Video format

- Resolution: SD, HD, Full HD, 4K UHD and 8K UHD
- Sampling: YCbCr-4:2:2 (for thumbnails & mosaic) 10-bit, 8-bit

### Audio format

- PCM/ AES67
- AES3
- 48, 96 kHz
- 16-bit, 24-bit sample

### Web UI

- Unlimited Number of Users
- User/Roles authentication via Keycloak Identity and Access Management Server
- Web-based user interfaces supported (version tested)
  - Google Chrome (76.0.3809)
  - Microsoft Edge (18.17763)
  - Mozilla Firefox (68.2)

### API

- REST API-first design
- Includes configuration, data metrics and thumbnails

### Alerts

Northbound alerts interface for NMS/OSS integration. Protocols supported:

- SNMP v3
- Web Push API
- Web Sockets
- SNMP v3
- Amazon SNS

### Appliances

- 1RU High Performance Servers
- Two monitoring ports, 100Gb/40Gb/25Gb QSFP28
- Two management ports, 1Gb
- Dual Redundant Hot Plug Power Supply

## Dimensions and Power Characteristics

### Dimensions

Height	42.8mm (1.68 in.)
Rack Width	434mm (17.08 in.)
Maximum Width	482mm (18.97 in.)
Rack Depth	712.95mm (28.06 in.)
Maximum depth with bezel	748.79mm (29.47 in.)
Weight	18.62 Kg (41.05 lbs)

### Power Characteristics

Typical Heat Dissipation	514 W (1753.8 BTU/hr)
Maximum Rated Heat Dissipation	920W (3139 BTU/hr)
Typical Input Power	50/60 Hz, 100–240 VAC, 5.14 A-2.14 A
Max Power Rating (per PSU)	50/60 Hz, 100–240 VAC auto-ranging, 9.2 A-4.7 A

## Ordering

### Inspect 2110 Base Unit

Product Code	Description	Application
INS-21	Inspect 2110 Base Unit	Inspect 2110, Base Unit, 25G Primary Media Port + 25G Backup Media Port
INS21-APPL650XS	Hardware only appliance replacement	Inspect 2110 R650XS Appliance Platform (appliance hardware only)

## Inspect 2110 Options

Product Code	Description	Application
INS21-25G	25G bandwidth monitoring license (per media port)	This license will enable the Inspect 2110 to monitor 25G of 2110/2022-6 traffic on the primary interface and 25G on the backup interface (50Gbps total). PTP monitoring is also enabled by default.
INS21-40G	40G bandwidth monitoring license (per media port)	This license will enable the Inspect 2110 to monitor 40G of 2110/2022-6 traffic on the primary interface and 40G on the backup interface (80Gbps total). PTP monitoring is also enabled by default.
INS21-100G	100G bandwidth monitoring license (per media port)	This license will enable the Inspect 2110 to monitor 100G of 2110/2022-6 traffic on the primary interface and 100G on the backup interface (200Gbps total). PTP monitoring is also enabled by default.
INS21-UP 40G-100G	40G to 100G bandwidth upgrade	License: Inspect 2110, Add Software license to upgrade 40G Primary Media Port and Backup Media Port to 100G
INS21-RVW	Add Audio remote listening through web browser	This license will enable the Inspect 2110 to listen to monitored audio essences on a remote web browser window. This functionality is typically used for human auditory verification of essences content/status.
INS21-AVVAL	Add Audio/Video Validation capability	This license will enable the Inspect 2110 to detect frozen frames and black frames in video essences and will also enable the detection of silence in the channels present in any of the audio essences monitored. This functionality is typically used for automated verification of the validity of the content being transported in the 2110 essences.
INS21-CPL	Add Compliance monitoring package	This license will enable the Inspect 2110 to measure the audio levels in the channels present in any of the audio essences monitored. This functionality is typically used for automated verification of compliance to the US CALM act for the content being transported in the 2110 audio essences.
INS21-JPXS*	Add JPEG XS monitoring capability	This license will enable the Inspect 2110 to decode and monitor 2110-22 video essences that have been encoded/compressed via the JPEG-XS standard. JPEG-XS compressed essences are typically used for contribution links and in ground-to-cloud, cloud-to-ground connectivity.
INS21-IVMS*	Add iVMS integration license	This license will enable the Inspect 2110 metrics to be collected, aggregated and displayed by the Telestream iVMS product. This license must be renewed on a yearly basis.
INS21-CAP*	Add PCAP capture capability	This license will enable the Inspect 2110 to manually or automatically (event triggered) capture the media network traffic in PCAP format. This functionality is typically used for troubleshooting of complex media network issues.
INS21-SCTE104*	Add ancillary data monitoring of SCTE-104 messages	This license will enable Inspect 2110 to monitor and report on SCTE-104 messages in the ancillary essences. This functionality is typically used for validation and troubleshooting of ad insertion directives.

INS21-MEAS*	Add advanced PTP measurements	This license will enable Inspect 2110 to collect enhanced PTP metrics (IEEE-15882019 Annex J). This functionality is typically used for deeper validation and monitoring of the PTP network.
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\* Contact Telestream for Availability

## Accessories

Accessory	Description
INS21-QSFP25-SR	Inspect 2110 SFP28 25Gbase LC-LC SR Transceiver with QSFP28 to SFP28 Adapter
INS21-QSFP40-SR4	Inspect 2110 QSFP+ 40Gbase-SR4 Transceiver
INS21-QSFP100-SR4	Inspect 2110 QSFP28 100Gbase-SR4 Transceiver
INS21-QSFP100-SRBIDI	Inspect 2110 100G/40G QSFP28 SR-BIDI Transceiver

