

## 980 DP 1.2 VIDEO GENERATOR / ANALYZER MODULE DP 1.2 RX ANALYZER OPTIONS



### OVERVIEW

The 980 DisplayPort 1.2 Video Generator / Analyzer module supports video generation for functional testing of a DP 1.2 display devices and analysis testing for DP 1.2 source devices. The module's Rx port supports up to HBR2 data rates including 1.63, 2.70 & 5.40 Gbps on 1, 2 & 4 lanes.

The DP 1.2 module's optional Rx analyzer port emulates a DisplayPort 1.2 display device including EDID and DPCD emulation, Rx Link Training function and MST Rx function.

There are two options for the analysis function for testing DP 1.2 source devices:

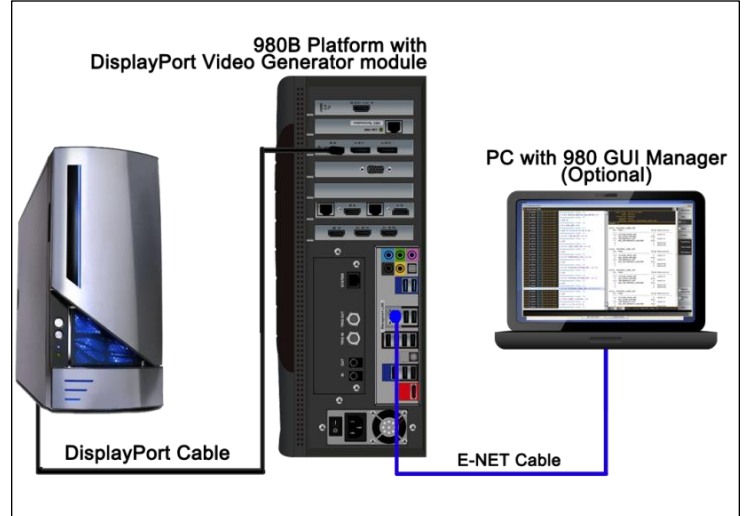
- 1) Basic Analyzer – Provides real time viewing of video and metadata for functional testing.
- 2) Protocol Analyzer – Provides capture and store of the main link including main stream attributes and secondary data. The Basic Analyzer must be purchased for this Protocol Analyzer option to be installed.

### BASIC ANALYZER OPTION

The module's basic Rx analyzer port enables you to view the incoming video, lanes and lane rate, timing colorimetry and various other metadata in real time at a glance. This feature provides a basic confidence test to verify that the incoming video is essentially correct. The Basic Analyzer also enables you to emulate any EDID on the Rx port to test a source devices handling of various EDIDs. You can also configure DPCD registers for emulating on the DP Rx port.

### PROTOCOL ANALYZER

The module's Protocol Analyzer option enables you to verify the capture the main link attributes and diagnose interoperability issues related to them. The Protocol Analyzer captures and stores main link data and provides visibility into main stream attributes, secondary data elements, K-Characters and protocol errors. The Protocol Analyzer presents these elements on a graphical timeline and in a table. You can select any transaction in the table and view its details. The capture utility enables you to capture specific MST streams from the source.



### AUXILIARY CHANNEL ANALYZER

The module's Rx analyzer port supports the Quantum Data Auxiliary Channel Analyzer (ACA) utility supports monitoring of hot plug events, EDID exchanges, HDCP authentication, DPCD register reads, link training transactions and MST negotiations between a DP source and the DP module's Rx port. The ACA logs these events and assigns precise timestamps to them. Once captured you can view the details of each transaction. The ACA enables you to pinpoint various failures on the DisplayPort link. These ACA can be saved and disseminated for further analysis by colleagues and other subject matter experts.

### 980 GUI MANAGER

The DP 1.2 Video Generator / Analyzer module can be controlled either through the PC-based 980 GUI Manager or through the embedded 980 GUI Manager running on the 980 platform itself. The 980's built-in color touch screen provides a graphical user interface (GUI) to control the module and view its status.

### SPECIFICATIONS

The following is a list of key specifications for the 980 DP 1.2 Video Generator module - Analyzer features.

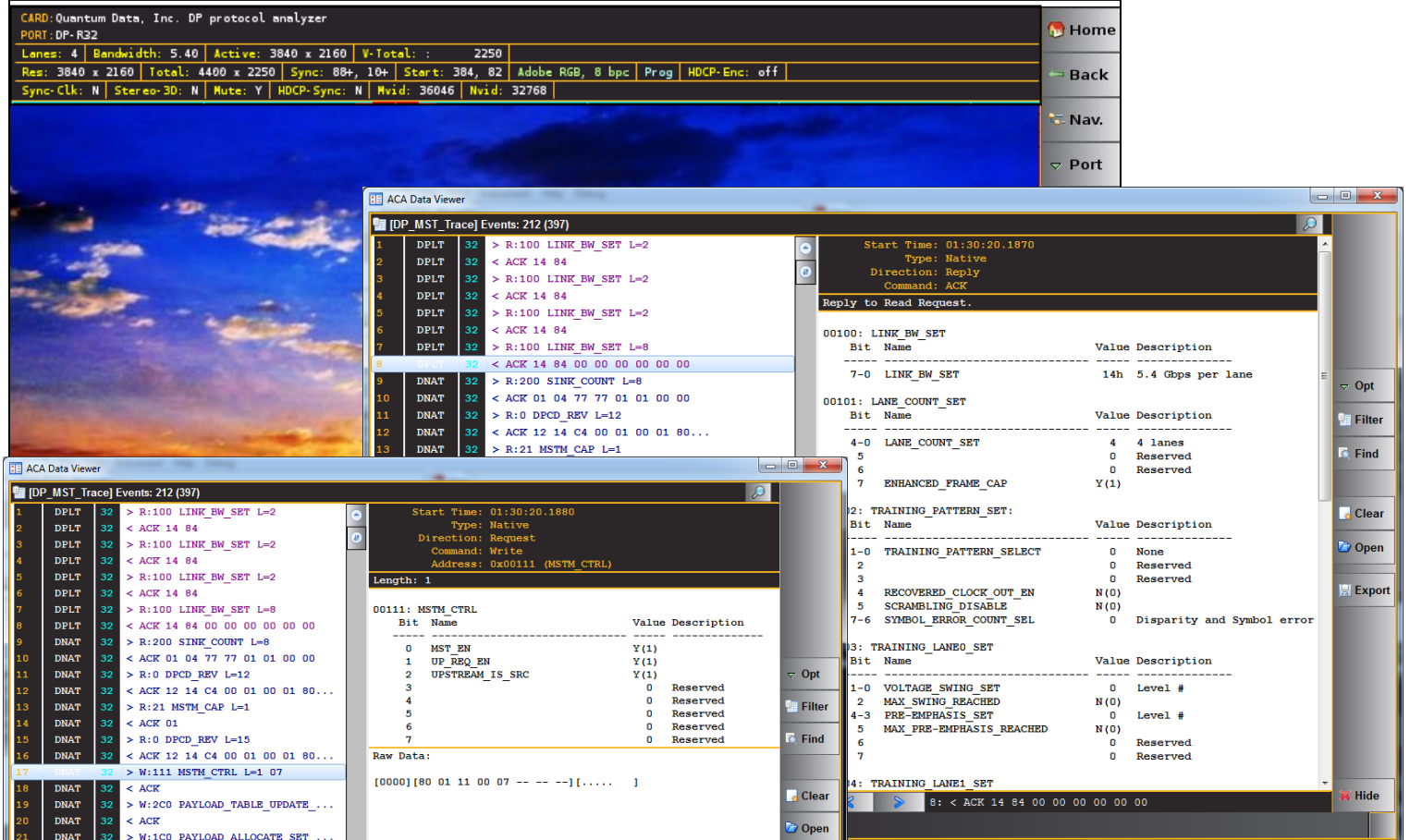
DP 1.2 INPUT - ITEM	SPECIFICATION
Version	DisplayPort 1.2
HDCP	Version 1.3
DP Rx Connector	(1) DP Standard
Data Rates	1.62, 2.70, 5.40 Gbps Lane rates
Lanes	1, 2, 4
Color Depths	8, 10, 12, 16 bits/component
Video Encoding	RGB, YCbCr
Video Sampling Modes	4:4:4, 4:2:2

980 DP 2.0 Video Generator / Analyzer module (Analyzer)  
Datasheet – Rev A2 – 5/12/2015

### DP 1.2 BASIC ANALYZER OPTION

The DP 1.2 Video Generator/Analyzer module's Basic Analyzer option supports basic analysis functions for testing DP 1.2 source devices. The following screen examples depict some of the analysis functions supported.

#### View Incoming Video, Metadata and General Status from connected source

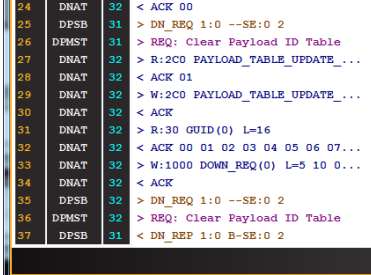


The screenshot displays the ACA Data Viewer interface. The top section shows system information: CARD: Quantum Data, Inc. DP protocol analyzer; PORT: DP-R62; Lanes: 4; Bandwidth: 5.40; Active: 3840 x 2160; V-Total: 2250; Res: 3840 x 2160; Total: 4400 x 2250; Sync: 88+, 10+; Start: 384, 82; Adobe RGB, 8 bpc; Prog; HDCP-Enc: off; Sync-Clk: N; Stereo-3D: N; Mute: Y; HDCP-Sync: N; Wvid: 36046; Nvid: 32768.

The main window shows a DP MST Trace with 212 events. The selected event is: 8 DPLT 32 > R:100 LINK\_BW\_SET L=2. The right pane shows the details for this event: Start Time: 01:30:20.1870; Type: Native; Direction: Reply; Command: ACK; Reply to Read Request. The event details table is as follows:

Bit	Name	Value	Description
7-0	LINK_BW_SET	14h	5.4 Gbps per lane
00100: LANE_COUNT_SET			
Bit	Name	Value	Description
4-0	LANE_COUNT_SET	4	4 lanes
5		0	Reserved
6		0	Reserved
7	ENHANCED_FRAME_CAP	Y(1)	
2: TRAINING_PATTERN_SET:			
Bit	Name	Value	Description
1-0	TRAINING_PATTERN_SELECT	0	None
2		0	Reserved
3		0	Reserved
4	RECOVERED_CLOCK_OUT_EN	N(0)	
5	SCRAMBLING_DISABLE	N(0)	
7-6	SYMBOL_ERROR_COUNT_SEL	0	Disparity and Symbol error
3: TRAINING_LANE0_SET			
Bit	Name	Value	Description
1-0	VOLTAGE_SWING_SET	0	Level #
2	MAX_SWING_REACHED	N(0)	
4-3	PRE-EMPHASIS_SET	0	Level #
5	MAX_PRE-EMPHASIS_REACHED	N(0)	
6		0	Reserved
7		0	Reserved
4: TRAINING_LANE1_SET			

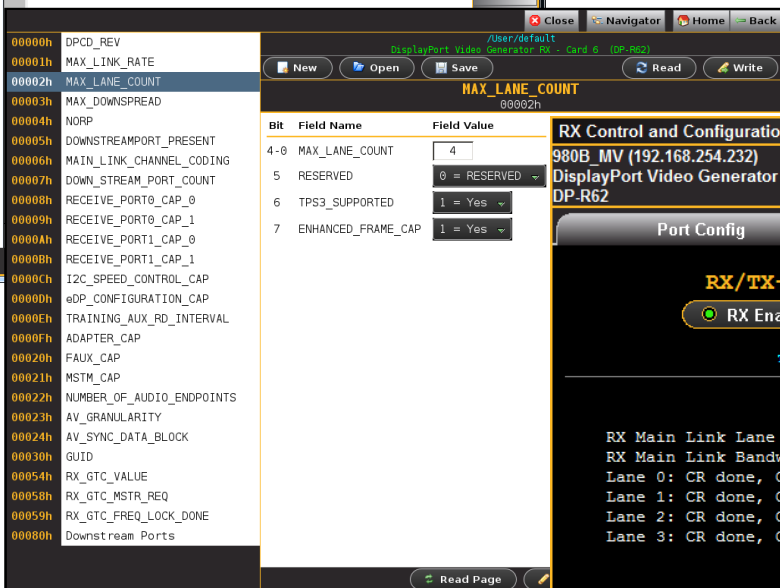
ACA Showing Link Training Transactions



The screenshot shows the ACA Data Viewer interface with a list of MST Side Band Negotiations. The selected event is: 37 DNAT 32 < W:111 MSTM\_CTRL L=1 07. The details pane shows: Start Time: 01:30:20.1880; Type: Native; Direction: Request; Command: Write; Address: 0x00111 (MSTM\_CTRL); Length: 1. The event details table is as follows:

Bit	Name	Value	Description
0	MSTM_EN	Y(1)	
1	UP_REQ_EN	Y(1)	
2	UPSTREAM_IS_SRC	Y(1)	
3		0	Reserved
4		0	Reserved
5		0	Reserved
6		0	Reserved
7		0	Reserved

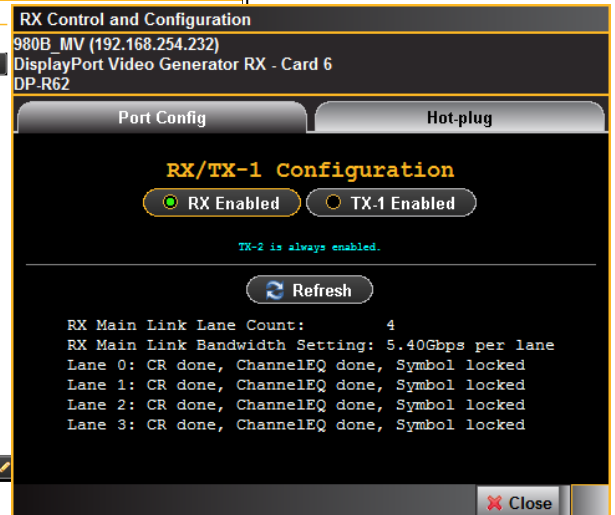
ACA Showing MST Side Band Negotiations



The screenshot shows the DPCD Editor interface. The selected field is MAX\_LANE\_COUNT (00002h) with a value of 4. The field details table is as follows:

Bit	Field Name	Field Value
4-0	MAX_LANE_COUNT	4
5	RESERVED	0 = RESERVED
6	TPS3_SUPPORTED	1 = Yes
7	ENHANCED_FRAME_CAP	1 = Yes

DPCD Editor



The screenshot shows the RX Control and Configuration interface. The selected field is RX\_LANE\_COUNT (00002h) with a value of 4. The configuration table is as follows:

Bit	Field Name	Field Value
4-0	MAX_LANE_COUNT	4
5	RESERVED	0 = RESERVED
6	TPS3_SUPPORTED	1 = Yes
7	ENHANCED_FRAME_CAP	1 = Yes

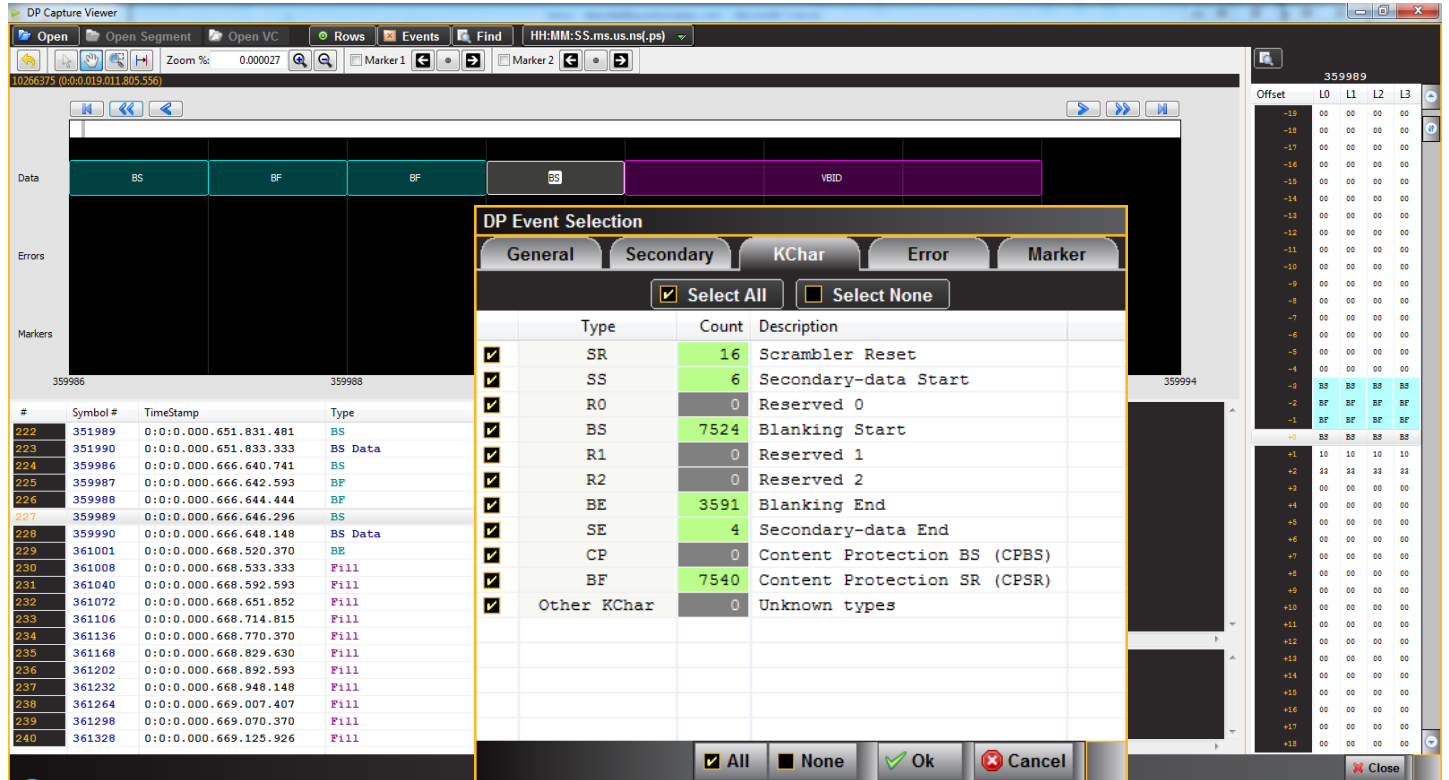
The RX/TX-1 Configuration section shows: RX Enabled (checked), TX-1 Enabled (unchecked). The RX Main Link Lane Count is 4. The RX Main Link Bandwidth Setting is 5.40Gbps per lane. The Lane status is: Lane 0: CR done, ChannelEQ done, Symbol locked; Lane 1: CR done, ChannelEQ done, Symbol locked; Lane 2: CR done, ChannelEQ done, Symbol locked; Lane 3: CR done, ChannelEQ done, Symbol locked.

Analyzer Control and Configuration

## 980 DISPLAYPORT 1.2 VIDEO ANALYZER – MAIN LINK CAPTURE ANALYSIS OPTION

The DP 1.2 Video Generator/Analyzer Main Link Capture Analyzer option includes the Basic Analyzer option plus the ability to capture and store protocol data. The following screen examples depict some of these functions.

### Capture Viewer depicting captured packets in graphic timeline and table – Event Selection Dialog to filter view

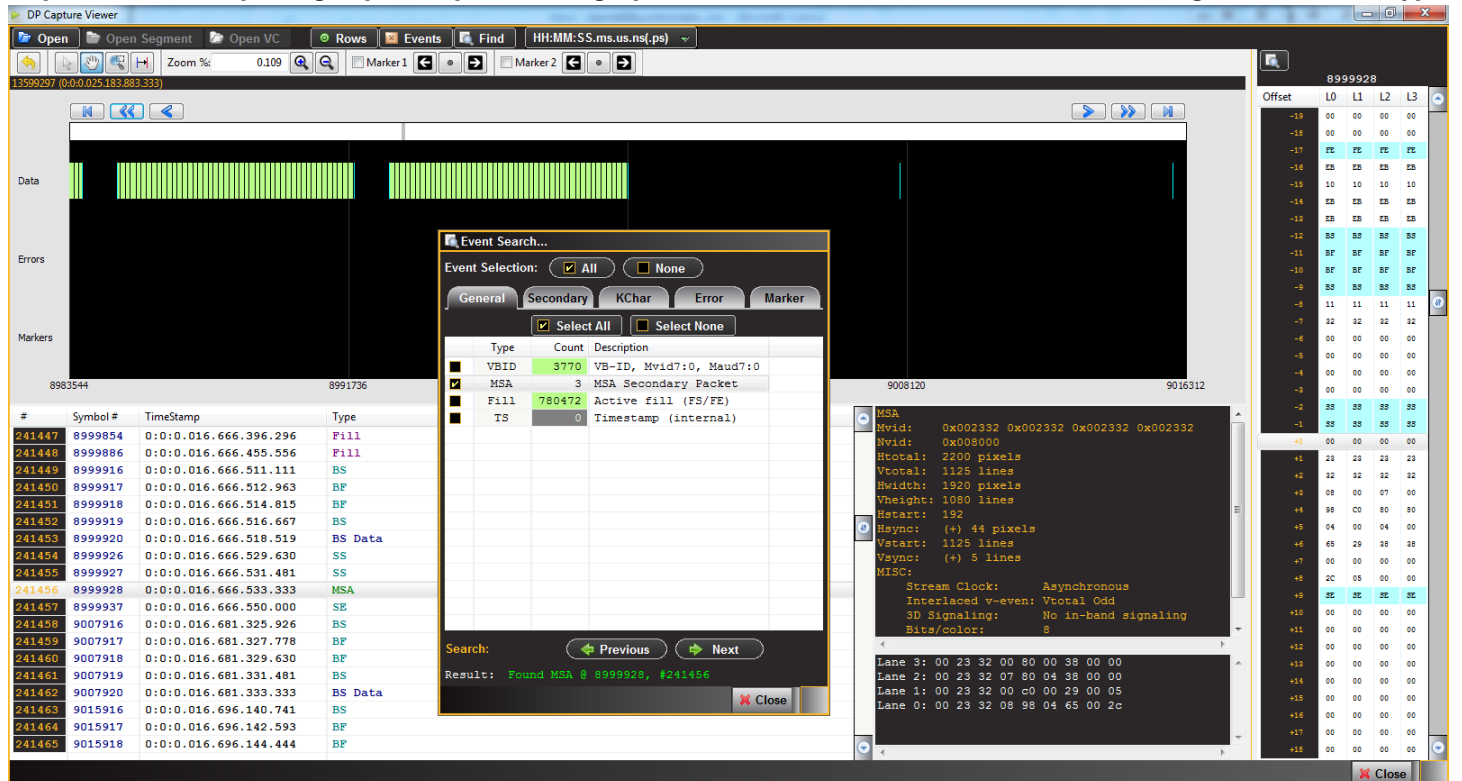


The screenshot shows the DP Capture Viewer interface. The main window displays a timeline of captured packets with a table below it. The table columns are #, Symbol #, TimeStamp, and Type. The Event Selection dialog box is open, showing a list of event types and their counts. The dialog has tabs for General, Secondary, KChar, Error, and Marker. The 'Select All' checkbox is checked.

Type	Count	Description
<input checked="" type="checkbox"/>	16	Scrambler Reset
<input checked="" type="checkbox"/>	6	Secondary-data Start
<input checked="" type="checkbox"/>	0	Reserved 0
<input checked="" type="checkbox"/>	7524	Blanking Start
<input checked="" type="checkbox"/>	0	Reserved 1
<input checked="" type="checkbox"/>	0	Reserved 2
<input checked="" type="checkbox"/>	3591	Blanking End
<input checked="" type="checkbox"/>	4	Secondary-data End
<input checked="" type="checkbox"/>	0	Content Protection BS (CPBS)
<input checked="" type="checkbox"/>	7540	Content Protection SR (CPSR)
<input checked="" type="checkbox"/>	0	Unknown types

#	Symbol #	TimeStamp	Type
222	351989	0:0:0.000.651.831.481	BS
223	351990	0:0:0.000.651.833.333	BS Data
224	359986	0:0:0.000.666.640.741	BS
225	359987	0:0:0.000.666.642.593	BF
226	359988	0:0:0.000.666.644.444	BF
227	359989	0:0:0.000.666.646.296	BS
228	359990	0:0:0.000.666.648.148	BS Data
229	361001	0:0:0.000.668.520.370	BE
230	361008	0:0:0.000.668.533.333	Fill
231	361040	0:0:0.000.668.592.593	Fill
232	361072	0:0:0.000.668.651.852	Fill
233	361106	0:0:0.000.668.714.815	Fill
234	361136	0:0:0.000.668.770.370	Fill
235	361168	0:0:0.000.668.829.630	Fill
236	361202	0:0:0.000.668.892.593	Fill
237	361232	0:0:0.000.668.948.148	Fill
238	361264	0:0:0.000.669.007.407	Fill
239	361298	0:0:0.000.669.070.370	Fill
240	361328	0:0:0.000.669.125.926	Fill

### Capture Viewer depicting captured packets in graphic timeline and table – Event Search Dialog to locate data types



The screenshot shows the DP Capture Viewer interface. The main window displays a timeline of captured packets with a table below it. The Event Search dialog box is open, showing a list of event types and their counts. The 'Event Selection' checkbox is checked. The search result is displayed in the dialog box.

Type	Count	Description
<input checked="" type="checkbox"/>	3770	VB-ID, VmId7:0, Maud7:0
<input checked="" type="checkbox"/>	3	MSA Secondary Packet
<input checked="" type="checkbox"/>	780472	Active fill (FS/FE)
<input checked="" type="checkbox"/>	0	Timestamp (internal)

Search: Previous Next

Result: Found MSA @ 8999928, #241456

#	Symbol #	TimeStamp	Type
241447	8999854	0:0:0.016.666.396.296	Fill
241448	8999886	0:0:0.016.666.455.556	Fill
241449	8999916	0:0:0.016.666.511.111	BS
241450	8999917	0:0:0.016.666.512.963	BF
241451	8999918	0:0:0.016.666.514.815	BF
241452	8999919	0:0:0.016.666.516.667	BS
241453	8999920	0:0:0.016.666.518.519	BS Data
241454	8999926	0:0:0.016.666.529.630	SS
241455	8999927	0:0:0.016.666.531.481	SS
241456	8999928	0:0:0.016.666.533.333	MSA
241457	8999937	0:0:0.016.666.550.000	SE
241458	9007916	0:0:0.016.681.325.926	BS
241459	9007917	0:0:0.016.681.327.778	BF
241460	9007918	0:0:0.016.681.329.630	BF
241461	9007919	0:0:0.016.681.331.481	BS
241462	9007920	0:0:0.016.681.333.333	BS Data
241463	9015916	0:0:0.016.696.140.741	BS
241464	9015917	0:0:0.016.696.142.593	BF
241465	9015918	0:0:0.016.696.144.444	BF