

IBIS-IP Beschreibung der Dienste / Service description

VideoDisplayService – V2.0

Gesamtbearbeitung

Ausschuss für Telematik und Informationssysteme (ATI)

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VideoDisplayService – V2.0

Gesamtbearbeitung

Unterausschuss für Telematik (UA-Telematik)

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Vorwort

Diese VDV-Schrift wurde aus der VDV-301-2 separiert, um Anpassungen an einzelnen IBIS-IP-Diensten unabhängig von anderen IBIS-IP-Diensten vornehmen zu können.

In der VDV-301-2 werden die technischen Grundlagen wie auch die Basisdienste, welche die Grundlagen eines IBIS-IP-Systems bilden, beschrieben. Die VDV-Schrift 301-2-13 beschreibt den Dienst VideoDisplay. Für eine allgemeine Einführung in die Videodienste sei auf VDV301-2-11 verwiesen.

Dieser Dienst VDV301-2-13 ist kompatibel zu VDV301 Version 1.0 und 2.x.

Foreword

This VDV-requirement document has been separated from the VDV-301-2 in order to make adjustments to individual IBIS IP services independent from other IBIS IP services.

The technical basics as well as the basic services of the IBIS-IP systems are described in the VDV-301-2. The VDV 301-2-13 describes the video display service. For a general description of video services please refer to VDV301-2-11.

This service VDV301-2-13 is compliant to VDV301 version 1.0 as well as 2.x.

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Abkürzungen / Abbreviations

CCTV	Closed Circuit Television (video system)
CVCU	Central Video Control Unit
ERM	Event Recording Mode (alarm/emergency recordings)
GPI	General Purpose Input (digital input)
HTTP	Hyper Text Transfer Protocol
H26x	Naming of several types of video codecs
IBIS	Integriertes Bordinformationssystem/Integrated on-board information system (on-board communication protocol)
IP	Internet Protocol
RRM	Ring Recording Mode (normal ring buffer recordings)
RTP	Real Time Protocol
RTSP	Real Time Streaming Protocol
SOA	Server Oriented Architecture
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
VDV	Verband Deutscher Verkehrsunternehmen e. V./Association of German Transport Companies
VDV301	IBIS-IP (also IBIS over IP or IBIS-IP) specification
VDV300	IBIS (analogue) specification
VS	Video stream

1 VideoDisplayService

1.1 Funktionen und Aufgaben des Dienstes *VideoDisplayService*

Der *VideoDisplayService* ist einer von mehreren IBIS-IP-Videodiensten:

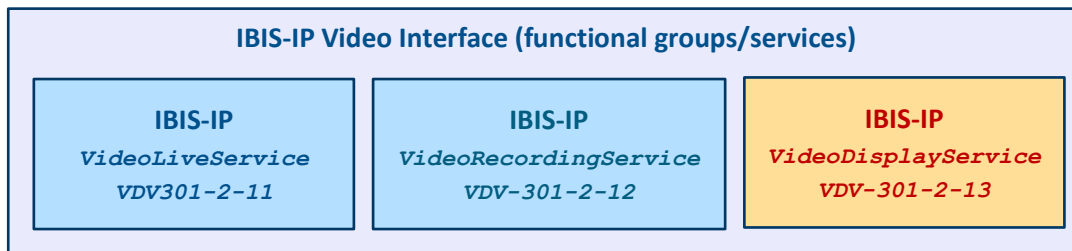


Figure 3: IBIS-IP Videofunktionsgruppen und Dienste

Die Aufgaben des Dienstes *VideoDisplayService* sind:

- Bereitstellung von Videobildern/-daten auf Monitoren/Displays oder anderen On-Board Systemen)
- Bereitstellung von Videobildern/-daten auf Monitoren/Displays außerhalb des Fahrzeugs (Back-Office, Zentrale)

Der Dienst *VideoDisplayService* hat folgende Funktionen:

- Generierung und Bereitstellung von zusammengeführten Videodaten aus Bildern mehrerer Kameras und/oder zusätzlicher Informationen, die auf Monitoren/Displays dargestellt werden können.
- Generierung von Sequenzen von Ansichten, die situationsabhängig dargestellt werden können (z.B. Triggersignal für Beginn der Alarmaufzeichnung)

Der Dienst kann in einer separaten CVCU implementiert werden, die eine Anwendung hostet und andere Dienste als *VideoLiveService* verwendet (z. B. Touchscreen-Monitor als Datensinke oder Videoaufzeichnungseinheit). Der Dienst generiert unterschiedliche Anzeigeformate (Einzel- oder Mehrfachansicht) und Sequenzen von Ansichten, anhängig von der Bildinformation, die vom *VideoLiveService* bereitgestellt wird.

Der *VideoDisplayService* kann durch OSD-Einblendung die Videodaten mit zusätzlichen Informationen ergänzen (z.B. Systemstatus, Aufzeichnungsmodus). Hierzu können zählen:

- Namen/ID/Beschreibung der Datenquellen (soweit möglich inklusive der Fahrzeugdaten wie ID, Position o.ä.)
- Datum und Uhrzeit
- Fehlermeldungen (Kamera, Speicher, GPS-Signal, Temperatur, Fahrgastzählung)
- Systemstatus (Aufzeichnungsmodus)

Auf diese Art zusammengeführte Daten können somit über die *Videoausgangsschnittstelle der zentralen Steuereinheit* (z.B. BNC-Koax, DVI, HDMI, Ethernet) auf Monitoren/Displays bereitgestellt werden. Die spezifischen OSD-Elemente sollen konfigurierbar und personalisierbar sein. Eine Steuerung über IBIS-IP ist vorstellbar und technisch möglich, wird aber zu diesem Zeitpunkt aufgrund der hohen Integrationskosten nicht in Erwägung gezogen.

1 VideoDisplayService

1.1 Functions and Tasks of the Service *VideoDisplayService*

The *VideoDisplayService* is one of several IBIS-IP video services:

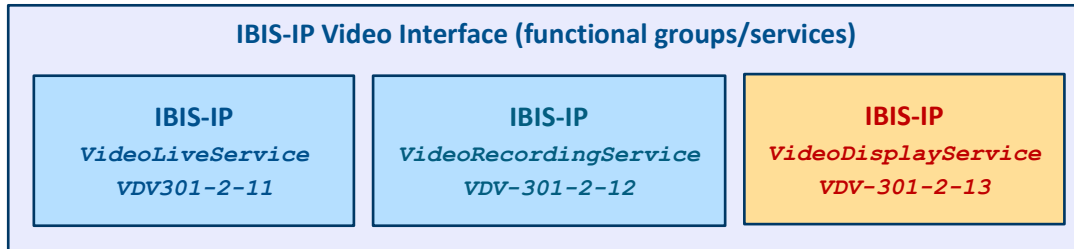


Figure 1: IBIS-IP video functional groups and services

The tasks of the service *VideoDisplayService* are:

- Provision of video images/data on monitors/displays or for other on-board systems inside a vehicle (on-board)
- Provision of video images/data on monitors/displays outside a vehicle (off-board, Back-Office)

The service *VideoDisplayService* provides the following functions:

- Generation and provision of combined video data based on images of several cameras and/or additional information which can be displayed on monitor(s)/display(s).
- Generation of sequences of views which can be displayed in dependence of specific situation (e.g. trigger signal for start of alarm recording)

The service can be implemented in a separate Central Video Control Unit, which hosts an application and uses other services as *VideoLiveService* (e.g. touch screen monitor as data sink or a Video Recording Unit). The service generates various display formats (single and multi-views) and sequences of views, depended of the image information which will be provided by *VideoLiveService*.

The video display service can complement and combine to additional information (eg system status, mode of recording) the video data via onscreen display (OSD Overlay). This may include:

- Names/ID/descriptions of data sources (possibly including position in the vehicle)
- Date and Time
- Error messages (Camera, Storage, GPS signal, temperature, Passenger Counting)
- System states (mode of recording)

Such combined are provided via video output interface of the Central Video Control Unit (e.g. BNC coax, DVI, HDMI, Ethernet) for display on monitor(s)/display(s).

The specific OSD elements shall be configurable and customizable. A control via IBIS-IP is conceivable and technically feasible, but will not be considered at this point due to the high integration costs.

2 Specification

2.1 Overview

The **VideoDisplayService** provides operations for displaying image content within the IBIS- IP vehicle architecture. The required information will be provided by **VideoLiveService**.

The Service starts automatically and displays a default view which can be configured in the central video control unit. If the Service is stopped the video display will be deactivated.

The display of live streams takes place in the configured views and sequences of views. A “single V-view” shows the live stream of one specific camera. “Multi-views” show image data of 2 or more cameras at the same time. Sequences of views are temporal sequences of multiple single or multi views with a configured display time on the monitor. The following graph shows the differences between views and sequences of views:

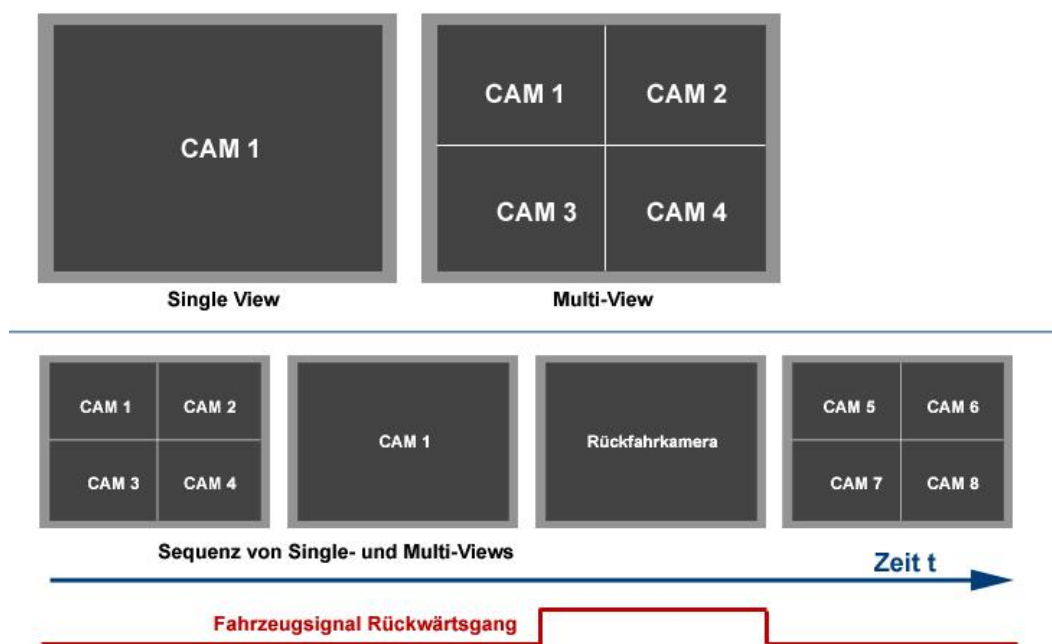


Figure 2: Various views and sequence depending on a vehicle signal

Types of view content which can be displayed:

- Camera video streams
- Still pictures
- Black screen
- Combination of pictures from several sources (e.g. Quad view with images from 4 cameras)
- Combination of video images from one or several sources including text information which will be merged in the view (OnScreenDisplay OSD).

Trigger signals for display control:

The views and sequences will be triggered either by IBIS-IP commands (operations) or by hard wired signals from vehicle which are connected to the digital input interfaces (General Purpose Inputs, GPI) of the Central Video Control Unit.

2.2 Architecture

Within a vehicle several systems may exist which offer and/or use the video services for several purposes:

VideoRecordingService

... for recording video images from picture sources and/or request stored video images

VideoDisplayService

... for display of video images from specific sources and/or a combination of several image sources from more than one image source and/or combination of image sources and additional information on one screen (OSD). The information can be: camera names, date/time information, navigation system information or other

VideoLiveService

... for request of real time video streams from picture sources

The ***VideoDisplayService*** can be implemented in an on-board system on demand. But it is recommended to implement it in a Central Video Control unit which can control and preprocess the image sources.

2.3 Addressing and protocols

Each device connected to the IBIS-IP network is configured with an IPv4 address and can be addressed by this address in the IBIS-IP network. The announcement of individual video services (by service name) will be realized as defined in accordance to VDV301 via DNS-SD (refer to references [1] and [2]).

For data transmission protocols TCP, UDP, HTTP will be used. Beyond these protocols the Real Time Protocol (RTP) and Real Time Streaming Protocol (RTSP) are used for transmission of video data in realtime. For the transmission of status data UDP is used.

2.4 Configuration of video system components

The configuration of video devices and/or video applications is not part of the IBIS-IP video services. The configuration of sources is realized either by the image source (e.g. configuration of network camera) or by a Central Video Controlling Unit (e.g. a MDVR).

2.5 Common Services

2.5.1 Camera Source information via VideoLiveService

The **VideoDisplayService** does not have any information regarding existing video sources in the IBIS-IP structure. This information will be requested by use **VideoLiveService** which will provide information regarding:

- Currently available sources in the vehicle/IBIS-IP structure
- Corresponding information (camera type, frame rate, URL (IP network cameras), stream ID, camera name and other)

If the user intends to use the **VideoDisplayService** also for controlling of video streams, pictures and additional OSD information the **VideoLiveService** must be used.

2.5.2 Identification of VideoDisplayService

According to VDV 301 every video service is identifiable within the IBIS-IP structure:

Subject identification:

- Service Name
- IBIS-IP version
- Device Type
- Device ID

Technical identification:

- system wide unique IP address or system wide unique DNS name
- device on which the service runs
- Service name,
- Ports and Path (optional), under which the service is accessible

2.5.3 DeviceManagementService and Error Handling

The video services will be started and monitored by **SystemManagementService** and **DeviceManagementService**. Any device that hosts a video application, implements the service **DeviceManagementService**, including its operations.

Each unit announces the device type, device ID and the available services to the **DeviceManagementService** for provision of the information within IBIS-IP architecture.

Errors on the video device will be signaled with by **GetDeviceStatus** and associated **SubscribeDeviceStatus**. By **DeactivateDevice** the video services can be terminated so that a voltage shutdown may not damage the disks and storage media (only for **VideoRecordingService**).

2.5.4 System start/stop procedure

The system behavior for all services at the start of the IBIS-IP system is identical and follows this sequence:

- On any device on which a video service will be implemented the **DeviceManagementService** must be implemented (only once) and must be started automatically while startup of the unit.
- After start of **DeviceManagementService** the video service publicates itself via DNS SD to be known in the IBIS-IP system.
- To start the display of images on a screen/monitor automatically after the start of the IBIS-IP system the operations for services of **DeviceManagementService** will be used (StartService, StopService, RestartService)
- The operations of the **VideoDisplayService** can now be used as required
- To stop and/or restart the **VideoDisplayService** the operations of **DeviceManagementService** shall be used

2.6 Operations of VideoDisplayService

All available operations of **VideoDisplayService**:

Operation	Req./Resp.	Beschreibung
ListViewCapabilities	Req.	-
	Resp.	VideoDisplayService.ListViewCapabilitiesResponseStructure
SetVideoView	Req.	VideoDisplayService.SetVideoViewRequestStructure
	Resp.	VideoDisplayService.SetVideoViewResponseStructure
SetNextViewIndex	Req.	-
	Resp.	VideoDisplayService.SetNextViewIndexResponseStructure
GetDisplayState	Req.	-
	Resp.	VideoDisplayService.GetDisplayStateResponseStructure
SubscribeDisplayState	Req.	SubscribeRequestStructure
	Resp.	SubscribeResponseStructure
UnsubscribeDisplayState	Req.	UnsubscribeRequestStructure
	Resp.	UnsubscribeResponseStructure

Table 1: Operations of IBIS-IP VideoDisplayService

2.6.1 Structure of Operation - ListViewCapabilities

2.6.1.1 Request

Since this is just a listing operation, there is no request structure needed for this operation.

2.6.1.2 Response

<i>VideoDisplayService.ListViewCapabilitiesResponse</i>				<i>+Structure</i>	
		<i>ViewID</i>	1:1	<i>IBIS-IP.int</i>	Identifier of the specific view
		<i>ViewName</i>	1:1	<i>IBIS-IP.string</i>	Name of view which can be defined by user in the video application and/or the configuration of a video unit (e.g. a Mobile Digital Video Recorder MDVR)
	a	<i>ViewType</i>	-1:1	<i>VideoViewEnumeration</i>	Refer to Description of VideoViewEnumeration (Table 3: Description - enumeration VideoViewEnumeration)

Table 2: Structure of operation - VideoDisplayService.ListViewCapabilitiesResponse

<i>Enumeration type</i>	<i>Value</i>	<i>Information</i>
<i>VideoViewEnumeration</i>	Single	Picture of one camera source, single frame view
	Dual	Pictures of two camera sources, dual/double frame view (split screen)
	Quad	Pictures of 4 camera sources, quad frame view (split screen)
	1plus5	Pictures of 6 camera sources (split screen), citure of one camera large sized, sources of 5 cameras small sized
	1plus7	Pictures of 8 camera sources (split screen), citure of one camera large sized, sources of 7 cameras small sized
	Nona	3x3 View (9 small screens (split screen) will be displayed on one view at the display)
	Black	Black screen, including text for diosplay on on screen display (On-Screen Display OSD)
	Sequence	Specific order of several views including the defined/configured time value for switching from one to another view.

Table 3: Description - enumeration VideoViewEnumeration

2.6.2 Structure of Operation - SetVideoView

2.6.2.1 Request

<i>VideoDisplayService.SetVideoViewRequest</i>		<i>+Structure</i>		
	<i>ViewID</i>	1:1	<i>IBIS-IP.int</i>	The identifier of the requested view
	<i>Timeout</i>	1:1	<i>IBIS-IP.duration</i>	Time of display for this specific view. This is also the time elapsed until the next view will be displayed (switching display content)

Table 4: Description - structure VideoDisplayService.SetVideoViewRequest

2.6.2.2 Response

<i>VideoDisplayService.SetVideoViewResponse</i>			<i>+Structure</i>		
a	<i>State</i>	-1:1	+VideoDisplayStateEnumeration	Response the current status of view. Refer to: Table 8: Description – enumeration VideoDisplayStateEnumeration	
	<i>CurrentViewID</i>	1:1	<i>IBIS-IP.int</i>	Identifier of current view	
	<i>OperationErrorMessage</i>	0:1	<i>IBIS-IP.string</i>	Response of error messages which can be defined	

Table 5: Description - structure VideoDisplayService.SetVideoViewResponse

2.6.3 Structure of Operation - SetNextViewIndex

2.6.3.1 Request

By use of this request *SetNextViewIndex* no data will be transferred.

2.6.3.2 Response

<i>VideoDisplayService.SetNextViewIndexResponse</i>			<i>+Structure</i>		
a	<i>State</i>	-1:1	+VideoDisplayStateEnumeration	Response the status of next view. Refer to: Table 8: Description – enumeration VideoDisplayStateEnumeration	
	<i>OperationErrorMessage</i>	0:1	<i>IBIS-IP.string</i>	This field contains error messages which can be defined by the user	

Table 6: Description – structure VideoDisplayService.SetNextViewIndexResponse

2.6.4 Structure of Operation - GetDisplayState

2.6.4.1 Request

By use of this request **GetDisplayState** no data will be transferred.

2.6.4.2 Response

<i>VideoDisplayService.GetDisplayStateResponse</i>			+Structure	
a	<i>State</i>	-1:1	+VideoDisplayStateEnumeration	Response the status of current view. Refer to: Table 8: Description – enumeration VideoDisplayStateEnumeration
	<i>CurrentViewID</i>	1:1	<i>IBIS-IP.int</i>	Identifier of the view which is be displayed currently
	<i>OperationErrorMessage</i>	0:1	<i>IBIS-IP.string</i>	This field contains error messages which can be defined by the user

Table 7: Description – structure VideoDisplayService.GetDisplayStateResponse

Enumeration type	Values	Description
VideoDisplayStateEnumeration	On	Video output signal is ready for operation
	Off	no Video out signal present (also no on screen display (OSD))
	InvalidViewID	The identifier of the view is not valid
	InvalidOperation	The operation is not valid and/or can not be processed. The switch to another view is not possible.
	NetworkError	IP network camera is not available in the network. Video presentation is not possible due to missing source.
	NoSync	Sync error of the video source (e.g. analogue camera has no sync). Video presentation is not possible due to missing source.

Table 8: Description – enumeration VideoDisplayStateEnumeration

2.6.5 Structure of Operation - SubscribeDisplayState

For subscription of data the structure(s) of VDV301-2 shall be used.

2.6.6 Structure of Operation - UnsubscribeDisplayState

For subscription of data the structure(s) of VDV301-2 shall be used.

Regelwerke – Normen und Empfehlungen / References

- (1) CEN/TS 13149-7 Öffentlicher Verkehr - Planungs- und Steuerungssysteme für
Straßenfahrzeuge - Teil 7: System- und Netzwerkarchitektur; Englische
Fassung CEN/TS 13149-7:2015 /

Public transport - Road vehicle scheduling and control systems - Part
7: System and Network Architecture

- (2) CEN/TS 13149-8 Öffentlicher Verkehr - Planungs- und Steuerungssysteme für
Straßenfahrzeuge - Teil 8: Physikalische Schicht für IP-Kommunikation;
Englische Fassung CEN/TS 13149-8:2013 /

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8: Physical layer for IP communication

- (3) VDV 301-1 Internetprotokoll basiertes integriertes Bordinformationssystem IBIS-
IP - Teil 1: Systemarchitektur /

VDV 301-1: IBIS-IP, Part 1: System architecture

- (4) /VDV 301-2 Internetprotokoll basiertes integriertes Bordinformationssystem IBIS-
IP - Teil 2: Schnittstellenspezifikation /

VDV 301-2: IBIS-IP, Part 2: Interface Specification V1.0

- (5) VDV 301-2-1 IBIS-IP Beschreibung der Dienste - Gemeinsame Datenstrukturen und
Aufzählungstypen /

IBIS-IP Description of Services – Common Data Structures and
Enumerations

- (6) VDV 301-2-11 IBIS-IP Dienst VideoLiveService v1.0, 1.0, 05/2017 /

IBIS-IP Service VideoLiveService v1.1, 1.0, 05/2017

- (7) VDV 301-2-12 IBIS-IP Dienst VideoRecordingService v1.0, 1.0, 05/2017 /

IBIS-IP Service VideoRecordingService v1.1, 1.0, 05/2017

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