XSD2017d

VDV-Implementation rules 453 – Swiss public transport

CUS version

Based on VDV Guideline 453 version 2.6.1

Author(s)	KIDS Working Group
Status	Approved and declared binding by KKI
Version	V 1.6
CUS subversion	V 1.0
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Copyright	

Contents

Change history from V 1.0 to 1.1

Section	Changes	Changed by	Changed on
Sect. 1.1	The implementation rules V1.1 support the new VDV Guideline 453 V2.4 dated July 2015	KIDS WG	22.09.15
Sect. 1.4.3	Mandatory fields: specifying mandatory fields without a value is not permitted in the Swiss public transport system Optional fields: resetting optional fields by omitting the value is allowed	KIDS WG	22.09.15
Sect. 5.1.4.2	Subscription data can be retransmitted in different successive data packets. Include as much detail as possible.	KIDS WG	22.09.15
Sect. 1.7	DIDOK stop list [4] was adopted as a reference for stops and transport companies (business organisation numbers) in implementation rules.	KIDS WG	22.09.15
Sect. 6.1.5	The FahrtID (journey ID) element was defined as mandatory (required for unique ID and referencing of journeys) Uniform format defined in Swiss public transport system for LinienID (line ID): [UIC country code]:[business organisation number]:[journey reference] The FahrtBezeichner [journey identifier] for the same journey must match in VDV453 and VDV454 services.	KIDS WG	22.09.15
Sect. 6.1.6	Uniform format defined in Swiss public transport system for LinienID (line ID): [UIC country code]:[business organisation number]:[technical line key] or [transport number]	KIDS WG	22.09.15
Sect. 6.2.4.1.1	Uniform delay of 30 seconds across all systems in Swiss public transport.	KIDS WG	22.09.15

Change history from V 1.1 to 1.3

Section	Changes	Changed by	Changed on
1.4	Reference [5] added	C. Heimlicher	18.12.17
5.1.4.1	Content deleted by link to section in text. DatensatzAlle=true (dataset all = true) redefined in section 4.1.4.2.1.	J. Wichtermann	02.11.17
5.1.4.2	Text added: The data supplier can decide whether or not to use the WeitereDaten (more data) mechanism.	D. Rubli	07.12.17
5.1.4.2.1	New section included from VDV Guideline 453.	J. Wichtermann	17.07.17
6.1.7	Section revised in accordance with the harmonisation of transport. In particular, the transport category sources were replaced by transport categories and the table was added.	C. Heimlicher	18.12.17
6.1.9	Section expanded in order to harmonise transport and table added. ????	C. Heimlicher	18.12.17
6.1.12	New section included from VDV Guideline 453. Numbering of the subsequent shifted.	J. Wichtermann	17.07.17
6.2.4.3.1	New content from VDV Guideline 453: AnkunftssteigText and AnkunftsSektorenText	J. Wichtermann	17.07.17
6.2.4.3.1. 6.2.4.3.2. 6.3.8.3.1. 6.3.8.3.5.	Transport category sources replaced by transport categories	C. Heimlicher	18.12.17
6.2.4.3.2	New content from VDV Guideline 453: Operational, AnkunftszeitASBPlan, HaltID, HaltepositionsText and FahrtInfo.	J. Wichtermann	17.07.17
6.3.8.2	Only the update added from VDV Guideline 453	J. Wichtermann	17.07.17
6.3.8.3.1	New content from VDV Guideline 453: FahrtBezeichnerText, AnkunftssteigText, AbfahrtssteigText, AnkunftsSektorenText, AbfahrtsSektorenText, Einsteigeverbot, Aussteigeverbot and Durchfahrt	J. Wichtermann	17.07.17
6.3.8.3.7	New content from VDV Guideline 453: VonRichtungsText, AnkunftszeitAZBPlan, AbfahrtszeitAZBPlan, HaltID, HaltepositionsText, FahrtInfo.	J. Wichtermann	17.07.17
6.2.3.1	New section included from VDV Guideline 453,	J. Wichtermann	02.11.17
6.2.3.2	New section included from VDV Guideline 453,	J. Wichtermann	02.11.17
6.2.3.3	New section included from VDV Guideline 453,	J. Wichtermann	02.11.17

6.2.3.3.1 6.2.4.3.1 6.2.4.3.2 6.3.8.3.1 6.3.8.3.5	The FahrtInfo structure and the ProduktID and BetreiberID content are now mandatory.	J. Wichtermann	02.11.17
6.2.4.2	Preview time added	J. Wichtermann	02.11.17

Change history from V 1.3 to 1.4.2

Section	Changes	Changed by	Changed on
Var.	Only changes to the Guideline are listed in the structures.	J. Wichtermann	28.11.2019
1.1	Instruction repeated: version XSD2017.c must always be used in the Swiss public transport system.	J. Wichtermann	14.09.2020
1.4	Adapted for new versions	J. Wichtermann	31.08.2020
6.1.2	Date and time formats are already clearly defined in VDV Guideline 453 and can be omitted here.	J. Wichtermann	28.11.2019
6.1.7	The list of permitted ProduktIDs (product IDs) was deleted and replaced by a link to the current document in Section 1.4	J. Wichtermann	28.11.2019
6.1.9	Cross-references added	J. Wichtermann	14.09.2020
6.1.13	Missing section: "Latency and processing analysis" added and its use defined across the Swiss public transport system.	J. Wichtermann	14.09.2020
6.1.14.1	The format for HaltepositionsText (stopping position text) was adopted in the implementation rules, including separator signs for rail.	J. Wichtermann	14.09.2020
6.1.14.3	Durchfahrt (through travel) incl. conversions added	J. Wichtermann	14.09.2020
6.1.14.4	Einsteigeverbot (no boarding) incl. conversions added	J. Wichtermann	14.09.2020
6.1.14.5	Aussteigeverbot (no alighting) incl. conversions added	J. Wichtermann	14.09.2020
6.2.3.3.1	Only changes to VDV Guideline 453 are listed. FahrtInfo (journey info), ProduktID (product ID) and BetreiberID (operator ID) mandatory in xxxFahrplanlage and xxxFahrtLoeschen	J. Wichtermann	31.08.2020
6.2.3.3.2	Missing section: "Information on direct communication" added.	J. Wichtermann	28.11.2019
6.2.4.2	Only changes to VDV Guideline 453 are listed.	J. Wichtermann	14.09.2020
6.2.4.2.2	Only changes to VDV Guideline 453 are listed. LinienID (line ID) clarification added	J. Wichtermann	31.08.2020

6.2.4.2.3	Only changes to VDV Guideline 453 are listed. AbbringerInfo (connector info): information on FahrtInfo (journey info), tracks, sectors and HaltepositionsText (stopping positions text) added.	J. Wichtermann	14.09.2020
6.2.4.3.1	Only changes to VDV Guideline 453 are listed. Cross-reference of HaltepositionsText (stopping position text) format among others added.	J. Wichtermann	14.09.2020
6.2.4.3.2	Only changes to VDV Guideline 453 are listed. Cross-reference to HaltepositionsText (stopping position text) format added.	J. Wichtermann	14.09.2020
6.3.8.2	Only changes to VDV Guideline 453 are listed.	J. Wichtermann	14.09.2020
6.3.8.3.1	Only changes to VDV Guideline 453 are listed. Several cross-references added. Implementation instruction: The new elements AnkunftFaelltAus (arrival cancelled) and AbfahrtFaelltAus (departure cancelled) must be received, evaluated and forwarded. More details about the conversion added. Sending an AZBFahrtLoeschen message is recommended in place of AZBFahrplanlage mit AnkunftFaelltAus=true and AbfahrtFAelltAus=true	J. Wichtermann	14.09.2020
6.3.8.3.5	Missing section: "Transmitting special text" added and its use defined across the Swiss public transport system.	J. Wichtermann	14.09.2020
6.3.8.3.6	Missing section: "Deleting special text" added and its use defined across the Swiss public transport system.	J. Wichtermann	14.09.2020
6.3.8.3.7	Only changes to VDV Guideline 453 are listed. Several cross-references added. Cross-reference of HaltepositionsText (stopping position text) format added.	J. Wichtermann	14.09.2020
10	As well as removed from the VDV Guideline	J. Wichtermann	31.08.2020

Change history from V 1.4.2 to 1.4.3

Section	**Change**	**Changed by**	**Changed on**
Page 1. Section 1.1 Section 1.4	XSD2017c replaced by XSD2017d.	KIDS WG	07.04.2021
Page 1. Section 1.1 Section 1.4	VDV453 version 2.6 replaced by version 2.6.1.	KIDS WG	07.04.2021
Section 1.4	VDV454 version 2.2 replaced by version 2.2.1.	KIDS WG	07.04.2021

Change history from V 1.4.3 to 1.5

Section	Changes	Changed by	Changed on
1.1 previously	The section was removed the redundant versions of VDV Guideline 453 and the XSD can be found in chapter 1.7 as well as on the front page.	KIDS WG	29.06.2021
1.1	New section Rules for Swiss public transport	KIDS WG	29.06.2021
1.2	Versioning of CUS subversions	KIDS WG	29.06.2021
1.4.3	Previously: If use deviates from the original VDV Guideline 453, the value in this document is shown in **bold** and **underlined**. Note: For some time now, only differences have been shown. The text was therefore obsolete.	KIDS WG	29.06.2021
1.7	The references were altered to the latest versions.	KIDS WG	29.06.2021
2.1.2	New definition of "preview time" in data platforms:	KIDS WG	09.09.2021
6.1.4	Text changed pertaining to ASBID / AZBID subscriptions	KIDS WG	29.06.2021
3.2.3 6.1.6.5 6.3.8.3.1	Intermediate destinations should always be stated in the Via element and the ViaHst1Lang, ViaHst2Lang and ViaHst3Lang elements. The Via element must always include the same information as Hst1Lang to ViaHst3Lang. When converting from XSD2015 to XSD2017, the information must be transferred to the Via element from ViaHst1Lang, as long as these are formatted 6.1.6.5by chapter.	KIDS WG	29.06.2021
6.1.6.1	Reference to the new IDS (SID4PT) added	KIDS WG	29.06.2021
6.1.14.2	Ankunfts-/AbfahrstSteigText must include content, whenever possible.	KIDS WG	29.06.2021
6.1.14.5	xxxFahrplanlage does not have to be forwarded when converting from XSD2017 to XSD2015, but xxxFahrtLoeschen *must* be forwarded.	KIDS WG	29.06.2021
6.2.3.3.1	The concessionaire is now included in the BetreiberID. However, the content must always match INFO+ Content of the Betreiber element defined more precisely.	KIDS WG	29.06.2021
6.2.4.2	Additional elements added and described.	KIDS WG	29.06.2021
1.1 (and subchapter) 1.3 1.4.4 1.4.5 1.4.6 1.6 2.1.3 4.3 6.2.4.2.4 6.3.8.1.1	New sections added, which are only relevant to CUS.	KIDS WG	29.06.2021

6.2.4.3	Tables with elements added and described	KIDS WG	29.06.2021
6.3.8.2	Tables with elements added and described	KIDS WG	29.06.2021
6.2.4.3.1 6.3.8.3.1	Ankunfts-/AbfahrtssteigText are obligatory in rail operations, with exceptions by mutual agreement.	KIDS WG	29.06.2021
6.2.4.3.2	Additional elements added and described. Note on Ursache: Ursache (cause) may only be stated when there is an Ausfall (cancellation).	KIDS WG	29.06.2021
6.3.8.3	Additional elements added and described.	KIDS WG	29.06.2021
6.3.8.3.1	Additional elements added and described. And text changed: If both elements are set as true, (**even stops at the start or finish of a route, both must be set as true**), an AZ-BFahrtLoeschen element should be triggered with the Ursache=Ausfall (cause=cancellation) when converting to an older XSD version. In the Swiss public transport rail system, the FahrtBezeichnerText includes the train number.	KIDS WG	29.06.2021
6.3.8.3.1	Implementation note on service cancellation according to CR 0156	J. Wichtermann, C. Heimlicher	07.09.21
6.3.8.3.7	Additional elements added and described. Note on Ursache: Ursache (cause) may only be stated when there is an Ausfall (cancellation).	KIDS WG	29.06.2021
6.2.4.3.1 6.3.8.3.1	HaltID is now mandatory	KIDS WG	29.06.2021
7	Glossary extended	KIDS WG	29.06.2021
8.1	Index of tables deleted	KIDS WG	29.06.2021

Change history from V 1.4.3 to 1.5, CUS V1.0

Section	Change	Changed by	Date
General	Everything in blue added to the Implementation Rules (RV) from SBB-Spez. 2.9.1.	J. Wichtermann	12.05.21
3.1.6	Comment on CUS added	C. Heimlicher	07.09.21
3.2.3	Text of CUS comment modified slightly	C. Heimlicher	07.09.21

Change history from V 1.5 to 1.6

Section	Changes	Changed by	Changed on
1.7	The use of the XSD "XML schema VDV453_incl_454_V2017d.xsd" is now mandatory. All elements from this XSD must be received without errors and forwarded in data hubs (CR_0200). The links have been adapted to the new repositories.	KIDS WG	28.04.2023

4.3 4.4	Chapter 4.4 on OAuth and subchapters has been removed. A reference to this repository has been added to Chapter 4.3.	KIDS WG	09.06.2022
4.4	With the introduction of the new Swiss IDs (SID4PT) and the necessary changes in the XSD2017, IDs may no longer be interpreted.	KIDS WG	25.02.2022
5.1.7 5.1.8	Application of the DataVersionID in Swiss public transport.	KIDS WG	21.06.2023
6.1.4	New subchapters 6.1.4.1 and 6.1.4.2 created for AZBID / AS-BID with and without SLOID. Special cases and explanations for AZBID / ASBID removed from RV. (CR 0175]	KIDS WG	15.12.2021 29.03.2022
6.1.5	New subchapters 6.1.5.1 and 6.1.5.2 for the trip identifier with or without SJYID. Default for SJYID removed, reference to specification. (CR 0175]	KIDS WG	15.12.2021 29.03.2022
6.1.7	The ProductID has been defined more precisely regarding national language and upper/lower case.	KIDS WG	25.02.2022
6.1.14	Chapter 6.1.14.4 renamed to HaltID without SLOID. Chapter 6.1.14.5 newly created, HaltID with SLOID (CR 0175]	KIDS WG	15.12.2021
6.1.14.1	The text length of the field HaltepositonsText is limited to 6 and not 5 characters in öV-Switzerland.	KIDS WG	25.02.2022
6.3.8.3.1	FahrtBezeichnerText: Description more precise..	KIDS WG	10.05.2022
6.2.3.3.1	Reminder of change in V1.5: In the element OperatorID always the transport company (GO number according to DiDok GO list [4]) is specified, which has the order (from BAV, canton, etc.) to operate this trip and has the concession for.	KIDS WG	28.04.2023
4.5	New chapter added with constraints to be considered during the SID4PT migration from Swiss public transport.	KIDS WG	12.05.2023
6.1.6	Chapter restructured and supplemented: conventional LinienID format unchanged, but new section for future SLNID format with references to SID4PT specification.	KIDS WG	12.05.2023
6.1.9	Definitions and implementation deadlines of ServiceAt-tributes NF and HL clarified, with HL newly added (origin is timetable).	KIDS WG	12.05.2023
6.1.14.4	Definition and rules regarding optional top point code clarified along with dependencies to DiDok.	KIDS WG	12.05.2023
6.1.14.5	Added new section with conversion rule between SLOID and HaltID via DiDok master data.	KIDS WG	12.05.2023

Änderungshistorie von V 1.5 zu 1.6, CUS, CUS V1.0

Stelle	Änderung	Bearbeiter	Datum
5.2.4	Die Angaben auf den aktuellen Stand gehoben, insbesondere URLs für Developer Portal und Schnittstelle aktualisiert.	A. Aesch-bacher	12.05.23

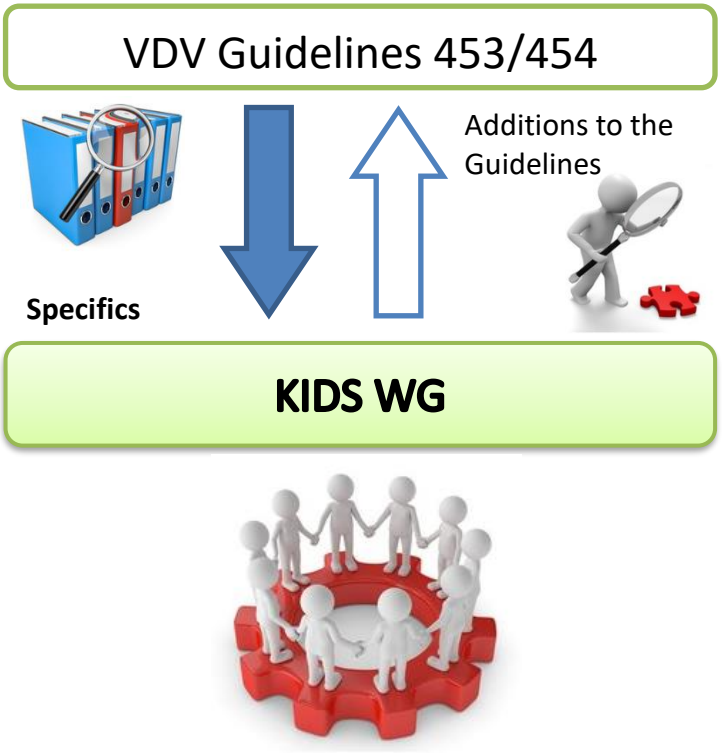
Release status

Version	Date	Status
1.0	07.11.2014	Approved by IT committee (VöV)
1.1	21.10.2015	Approved by IT committee (VöV)
1.2	01.10.2018	Reviewed by IT committee and recommended for release
1.2	24.10.2018	approved and declared binding by SKI management board
1.4.2	11.11.2020	approved and declared binding by SKI management board
1.4.3	05.05.2021	approved and declared binding by SKI management board
1.5	27.10.2021	approved and declared binding by SKI management board
1.6	30.08.2023	approved and declared binding by KKI

1. Preliminary remarks

Based on the official VDV Guideline 453 (published by the German Association of Transport Companies (VDV), this document describes the implementation rules for public transport in Switzerland, hereinafter abbreviated to VDV-RV 453.[1]

It explains the specifics and deviations from the official guideline, with the aim of ensuring its uniform application across the entire Swiss public transport system.



Implementations rules (VDV-RV 453) as a common basis across the Swiss public transport system

The implementation rules in this document have been agreed upon by the KIDS working group (Kundeninformationsdaten-Schnittstellen, or customer information data interface) in the Swiss public transport system) and are the result of a standardisation process that concerns the uniform application of VDV Guidelines across the Swiss public transport system.

The implementation rules are officially approved by the SKI management board.

The implementation rules consist largely of:

- Concretisation of points that are purposely defined in an abstract and open-ended manner in the VDV Guideline.
- Concretisation of points that were previously handled in an inconsistent manner by Swiss public transport.
- Deliberate deviations from the official VDV Guideline within Swiss public transport.

1.1. Guidelines for Swiss public transport and CUS additions (additions to VDV RV 453)

(Because the following text is only relevant for direct connection to CUS, it may potentially be hidden. The documentation in its entirety is available only in the CUS version)

This document contains both the generally applicable agreement on the Swiss public transport system and CUS (the central data hub for public transport in Switzerland). The following colours are used to improve legibility:

Text colour	Meaning
Black	Rules apply to all Swiss public transport systems
Blue	Additional rules for all connections to CUS

The rules in black letters are binding for all partners operating within the Swiss public transport system; all other colours are only for a direct connection to CUS.

1.2. Versioning of CUS subversions/change log (additions to VDV-RV 453)

(Because the following text is only relevant for direct connection to CUS, it may potentially be hidden. The documentation in its entirety is available only in the CUS version)

An additional CUS subversion is maintained for CUS texts. It uses a separate ascending number without any decimal places. The number is only increased if additional CUS-specific texts are needed for changes between two versions of the implementation rules that do not have to be accepted by the management board.

The separate CUS subversion will be inserted into the document names in the following position:
VDV453_Realisierungsvorgabe_ÖV_CH_V1.5_CUS_V1_Basis_XSD2017_DE
This will not affect the allocation of new RV version numbers.

The list of changes is divided into RV (as before) and CUS with blue text, marked with the option "ausgeblendet" (hidden).

1.3. On behalf of FOT (Addition in VDV-RV 453)

(Because the following text is only relevant for direct connection to CUS, it may potentially be hidden. The documentation in its entirety is available only in the CUS version)

The scope of the interfaces to the CUS real-time data hub is described in the FOT service-level agreement LV 2021 - 2024 [6]. Real-time information on the journeys of all participating transport undertakings is exchanged using the information from the timetable forecast interfaces.

Transport undertakings that do not work with the RCS system use the VDV interface to exchange real-time information. VDV Guideline 453 offers many options for the exchange of real-time forecasts. Services related to the working timetable based on the service agreement LV 2021 - 2024 [6] are shown in the INFO+ product.

1.4. Document structure and scope (additions to VDV-RV 453)

1.4.1. Scope

These implementation rules for the Swiss public transport system (VDV-RV 453) supplement the official VDV Guideline 453 and describe only deviations, changes and concretisations of this guideline. This document does **not** replace the official VDV Guideline 453 and therefore does not contain the complete information needed to implement or understand the VDV453 interface.

In addition to these implementation rules, the respective partners require an agreement that is even more specific than described here and is tailored to the individual circumstances and needs of the individual partners. This agreement explains points not described here and may also contain explicit deviations and additions to VDV-RV 453, provided that both partners and all other relevant committees/partners concur. These bilateral or multilateral specifications (hereinafter referred to as Partner2Partner specifications) should always refer to this VDV-RV 453 and be based as closely as possible on this.

This document should not be interpreted as a contract. The contractual situation between two partners or their suppliers is not part of this document.

1.4.2. Uniform chapter structure

In order to facilitate direct comparison between the implementation rules and the official VDV Guideline, the section structure of the official VDV Guideline 453 [1] has been consistently applied in this document, **beginning with Section 2**.

More specifically, this means that:

- The official VDV Guideline 453 generally applies. The statements and definitions set out in the official VDV Guideline 453 [1] are not repeated in this document[1].
- A **blank section** in this document means that the original VDV Guideline apples without exceptions or additional stipulations. The section is marked as follows: “(see VDV Guideline 453)
- If specifics or deviation from the standard is necessary due to special circumstances within Swiss public transport, these will be described in detail in the section in question.
- The official VDV Guideline 453 purposefully does not make any stipulations on metadata for data exchange between VDV partners. Stipulations on individual metadata and their structure, which apply to the whole Swiss public transport system[2], are described in the relevant sections.

The consistency of the section structure is guaranteed, with the following caveat:

If an explanation or addition is necessary and does not match the specified section structure, a separate section will be added at the end of the section level in question, which always has the extra text (**Addition in VDV-RV 453**) in the title. This section (including any subsections) does not correspond to the official VDV Guideline 453 and placing it at the end of the section level does not therefore affect other section numbers that follow it.

[1] An exception to this rule will be made if a brief description of the normal case defined in VDV Guideline 453 is required or practical in order to understand a subsequent text or the general context.

[2] The rules are defined by the KIDS working group and apply as the standard for the Swiss public transport system.

1.4.3. Mandatory, optional and non-supported fields

In the tables describing the XML structure of a data element, the last column specifies whether the element in question is mandatory or optional.

Manda-tory	Element must be specified in the XML structure **and** contain a semantically meaningful value. Specifying a mandatory field without a value is not allowed.
optional	Element can be specified or can be omitted. If the element is specified, it should contain a semantically meaningful value. A previously delivered value can be reset by explicitly not specifying the value when the element is transferred again (if this is permitted by the XSD definition). If the optional element is omitted in the case of a change notification, the value from the last transfer applies. If the optional element is omitted in the case of a complete journey, the value is reset to the default (if defined) or otherwise left blank (null).
n/a	Element is not supported. If it is specified, the content will be ignored. All data elements that are not supported or are not known to the system-specific XSD are to be ignored by the system. A processing or validation error must not result from this.

Table 1: Mandatory and optional fields

1.4.4. Differentiation of the roles of CUS (Addition in VDV-RV 453)

(Because the following text is only relevant for direct connection to CUS, it may potentially be hidden. The documentation in its entirety is available only in the CUS version)

It is important to distinguish in some places whether CUS functions in relation to a particular service as a data recipient (client) or as a data supplier (server), or as a data hub (DDS) or as a railway data producer (DPB). The passages in question are marked as follows:

CUS as a data server:

- CUS as data platform – DDS (server) (*standard when not marked)*
- CUS as railway data producer – DPB (server) *(always marked)*

CUS as data client:

- CUS as data platform – DDS (client) *(standard when not marked)*
- CUS as rail data producer – DPB (client) *(always marked)*

1.4.5. CUS as data platform *(*Addition in VDV-RV 453*)*

(Because the following text is only relevant for direct connection to CUS, it may potentially be hidden. The documentation in its entirety is available only in the CUS version)

As a data platform, CUS basically supports all elements of the VDV Guideline 453 of the ANS and DFI process data services (see Section1.6). Where special treatments and exceptions exist, they are explicitly marked in the document. (cf. Section 1.4.4).

- As a data platform, CUS distributes its own data and the data of partners supplied via one of the VDV453 data services (ANS, DFI). Provided that it complies with the standard, the incoming data is stored in CUS and forwarded unchanged to recipients.

  - With CUS as the rail data platform/data producer, the accuracy of the content of the elements is, with few exceptions, not checked and they are forwarded unchanged. The supplier of the data is responsible for ensuring the quality of the data supplied and not the data platform.

- Real-time data supplied to CUS as a data platform is forwarded unchanged to recipients. Rail data is an exception to this (see below). For information on the origin and currency of the data, see Section 2.1.2

- As a data platform, CUS ensures that the individual VDV data services can be used as standalone services, individually and independently:
  - Technically speaking, CUS as a data platform strictly separates VDV453 data from VDV454 data.
  - With CUS as the rail data producer, the data of the individual services (DFI, ANS) are persisted separately. If there is a change in one element that is relevant to several services, the change must be conveyed via each service separately.

- As a data platform, CUS regularly deletes the data from the previous operating days. However, the recipients can always access the data from the current and previous days.

- As a data platform, CUS makes schema changes with inbound delivery via the XSD2015 interface and outbound delivery via XSD2017 and v.v. This affects.
  - Cleaning up of items that are identified as inbound but do not exist as outbound.
  - Populating items that missing as inbound but are mandatory for outbound.

The requirements for CUS as a data platform regarding referencing or producing a journey, line or direction reference are listed in Section 6.1.6 Line and direction references.

1.4.6. CUS as rail data producer – DPB (Addition in VDV-RV 453)

(Because the following text is only relevant for direct connection to CUS, it may potentially be hidden. The documentation in its entirety is available only in the CUS version)

As a data producer, CUS only supports the elements of the VDV Guideline 453 that are specified in this document.

- As a rail traffic data producer, CUS consolidates incoming raw data from railway operating systems for timetable production and supplies this as produced data to interested customers via the Swiss public transport data platform.
- Rail traffic data supplied by VDV partners via VDV453 is passed on to the CUS core, where it may be subject to transformation. Transformation may be necessary, for example, for mapping incoming data to the storage of the CUS core or to enable journey recognition. SBB cannot therefore guarantee that data supplied to the system by one partner will be delivered in an unaltered form to another partner. However, SBB will endeavour to deliver to other interested partners all the information it receives from a partner via the VDV interface in a semantically complete form, if this is technically possible.
- In this case, the production of the timetable data and the use of the algorithms, rounding rules, threshold values and semantic formatting required to do so is the responsibility of CUS as the data producer.
- As the data producer, CUS provides actual timetable data within the scope of the VDV standards via the ANS and DFI data services.

1.5. Binding nature (Addition in VDV-RV 453)

This document describes how VDV Guideline 453 is applied and interpreted specifically within Switzerland. It forms the basis of agreements for VDV connection between the individual public transport partners for exchanging current data.

In addition to the stipulations in this document, the respective partners will not need to agree upon metadata defined either here or in the official VDV specification.

Text in blue is only mandatory for a direct connection to CUS.

1.6. VDV services supported by SBB (Addition in VDV-RV 453)

(Because the following text is only relevant for direct connection to CUS, it may potentially be hidden. The documentation in its entirety is available only in the CUS version)

SBB does not implement all of the services provided for under the VDV Guideline 453. The services supported by SBB are listed in the table below. These services are largely independent from each other and can therefore also be used independently by partners concerned.

Service	Supported by SBB	Comments
Connection protection reference data service (REF-ANS)	No	• Exchange of working timetables and journey references for ensuring connections
Connection protection process data service (ANS)	**Yes (but only feeder message)**	• Exchange of actual data for ensuring connections (inbound and outbound) • SBB only supports the feeder message, but not the departure message. The DFI message is used as a return channel. • "SBB→ partner "and "partner → partner" are supported but not partner →SBB. • Only the time-related subscription is used.
Reference data service passenger information (REF-DFI)	No	• Exchange of place-related working timetables and journey references for passenger information.
Process data service passenger information (DFI)	Yes	• Exchange of actual data for passenger information. • This service is implemented bi-directionally.
Process data service visualisation (VIS)	No	• Exchange of actual data for the visualisation of vehicles in external control centres.
General messaging service (AND)	No	• Exchange of text-based information on operating status between control centres.

Table 2: Services supported by the VDV Guideline 453

1.7. Documents referenced

[1] German Association of Transport Companies VDV
VDV Guideline 453 - Live data interface timetable information, version 2.6.1, Cologne (Germany), 2021
https://www.xn--v-info-vxa.ch/de/branchenstandard/branchenstandard-kundeninformation-bs-ki/technische-standards

[2] German Association of Transport Companies (VDV)
XML schema VDV453_incl_454_V2017.d.xsd (version: 2017.d), Cologne (Germany), 2021
https://www.vdv.de/i-d-s-downloads.aspx

[3] German Association of Transport Companies VDV
VDV Guideline 454 - Live data interface timetable information, version 2.2.1, Cologne (Germany), 2021
https://www.xn--v-info-vxa.ch/de/branchenstandard/branchenstandard-kundeninformation-bs-ki/technische-standards

[4] Federal Office for Transport (BAV)
Stops (DiDok list), Bern (Switzerland)
https://opentransportdata.swiss/en/dataset/didok

[5] Alliance Swiss Pass
V580 – FIScommun / product no. 06 Harmonisation of transport
06 Harmonisierung Verkehrsmittel
https://www.allianceswisspass.ch/de/tarife-vorschriften/uebersicht/V580/Produkte-der-V580-FIScommun-1

[6] Federal Office of Transport (FOT) - Swiss BAV
Service-level agreement SBB 2021 to 2024
https://www.bav.admin.ch/dam/bav/de/dokumente/das-bav/finanzierung/abgeschlossene-lv-2021-2024/lv-sbb-2021-2024.pdf.download.pdf/SBB%20LV%202021-2024.pdf

[7] SID4PT
https://www.xn--v-info-vxa.ch/de/branchenstandard/branchenstandard-kundeninformation-bs-ki/technische-standards

2. Introduction

2.1. General

This document, together with the official VDV Guideline 453 [1], defines the Swiss-wide standard for implementing the VDV interface, as well as individual data structures, based on the mutual exchange of real-time transport information between public transport companies using the ITCS (Intermodal Transport Control System) or data platforms.

Both documents, when taken together, describe in detail:

- what data can be exchanged between public transport partners?
- what data can be exchanged between CUS and a public transport partners?
- what elements of the VDV Guideline are supported within the Swiss public transport system?
- explicit deviations from the corresponding VDV Guideline
- the format of an individual data element
- the content and time-related data flows
- what agreements on metadata are necessary?
- what tasks are involved in the introduction of the interface and how these can be divided up or coordinated between CUS and the public transport partner.
- what needs to be considered when operating the interface?
- how the data is exchanged (formats, communication protocols, etc.)
- how data is to be interpreted when it is not clear from VDV Guideline 453 or when its use deviates from VDV Guideline 453

2.1.1. Transport (Addition in VDV-RV 453)

The term "*vehicle*" [5] and its abbreviation *VM* used in this document refers to all means of transport relevant to customer information (e.g. train, bus, tram, boat, funicular, etc.). An individual trip on a means of transport is called a *journey*.

2.1.2. Data storage and actuality (Addition in VDV-RV 453)

(see VDV Guideline 453)

Preview time in data platforms:

Preview time only makes sense in connection with a subscription to the ITCS; all other systems in the supply chain must apply this definition by default.

If a subscriber to a data platform wishes to extend the preview time, it can still only deliver the data covered by the ITCS subscription, i.e. in accordance with the preview time of the subscription to the ITCS.

If a subscriber of a data hub wishes to shorten the preview time, this would require the platform to withhold received data until the preview time occurs. To do this, the data platform would have to be able to tell whether this data is dependent on the preview time or would have to be forwarded immediately upon receipt anyway. The data platform is unable to do this, however, which is why a data platform must always forward all received data immediately. In doing so, the data platform will ignore the preview time of the subscriber.

CUS as data platform – DDS (client)

Incoming data is passed on unchanged to recipients immediately upon receipt.

CUS as rail data producer – DPB (client)

Information received via the VDV interface about the trains of a public transport partner (<DatenAbrufenAntwort>) is received by the VDV interface and then sent to the CUS core. This means that the information received via one service is subsequently also available to other services. Once the data has been stored, the CUS core no longer identifies its origin.

In order to assign these messages to the appropriate train or its stop, the journeys or stops must be clearly identifiable (see Section 6.1.4 or 6.1.5).

The real-time information supplied by partners is received via the VDV interface is stored within the CUS core. A computer uses the data to calculate the connection situation at individual operating locations and stations and to display this information on departure time displays.

Calculation of the connection situation begins around 20 minutes before the arrival of the feeder before a train enters a station, the connection message is compiled and made available to the customer systems.

Connection messages are received, for example, by KIS (Customer Information System) running on the vehicle platform, transmitted to the feeder train via an air interface and displayed on the interior displays of the vehicles.

2.1.3. Interoperability of DFI-ANS (Addition in VDV-RV 453)

(Because the following text is only relevant for direct connection to CUS, it may potentially be hidden. The documentation in its entirety is available only in the CUS version)

The following scenario illustrates the interoperability of the two VDV services DFI and ANS, as well as the information flow between the systems of SBB and a partner.

Background to this example:

- A bus travelling on line 33 to Hünenberg with a scheduled departure time of 17:30 connects with the S1 with a scheduled arrival time of 17:25.
- The fixed transfer time of five minutes is not shortened.
- The S1 is running five minutes late. This means that the bus must be delayed by five minutes to enable the connection.
- The partner has an ANS subscription with CUS for this operating location and is notified of the expected train arrival times.
- CUS has a DFI subscription with the partner to obtain information about vehicle departures and display this on the train if necessary.

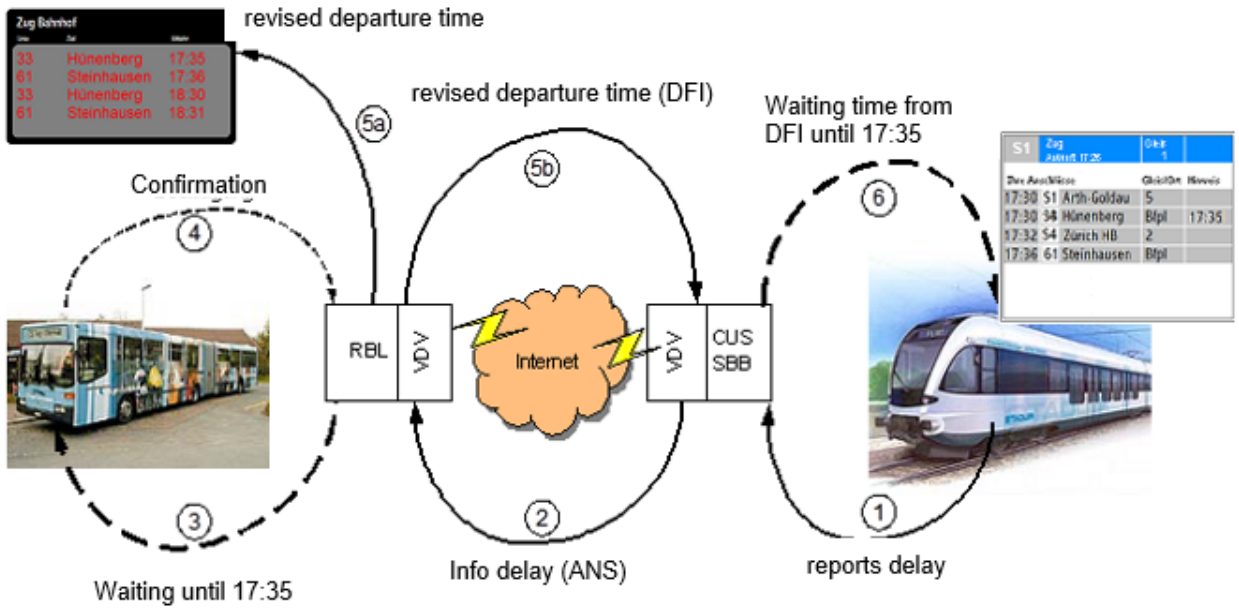


Figure 1: VDV information flow with the help of an example

In this scenario, the following information is exchanged:

1. The delayed arrival of a train is identified in CUS and reported to the VDV interface.
2. The VDV interface reports the delay of the feeder train to the partner's vehicle monitoring system via the VDV protocol (ANS).
3. Where possible, the partner's vehicle monitoring system holds back the bus in response to the delay (automatically or by a coordinator and notifies the bus driver of the new departure time.
4. The bus driver acknowledges receipt of the late arrival notification.
5. The revised departure time:
    a. is updated at the bus stop (in reality, the expected delayed departure time is not shown as a time of day)
    b. is sent to CUS via the VDV interface.
6. CUS uses the new bus departure time to calculate and display the delayed train's connection situation.

2.2. Objectives

(see VDV Guideline 453)

2.3. Overall concept

(see VDV Guideline 453)

3. Introduction and basic terms

(see VDV Guideline 453)

3.1. Connection protection (ANS)

3.1.1. Mission and goals

(see VDV Guideline 453)

3.1.2. Feeder-fetcher principle
(see VDV Guideline 453)

3.1.3. Definition of company-wide connection protection
(see VDV Guideline 453)

3.1.4. Operational characteristics
(see VDV Guideline 453)

3.1.4.1. Railway station
(see VDV Guideline 453)

3.1.4.2. Multiple connections
(see VDV Guideline 453)

3.1.4.3. Multiple stops visited
(see section 6.1.8 for`<HstSeqZaehler>`)

3.1.5. Journey and connection planning (working timetable)
(see VDV Guideline 453)

3.1.6. Connection areas
(see VDV Guideline 453)

CUS comment:

The CUS DFI service does not support the direct control of displays described in VDV Guideline 453. The ASBID (as well as the AZBID) always references a complete stop (or more precisely, a service in accordance with the DiDok directory, see [4]). No additional ASBIDs (or AZBIDs) may be specified for individual stops, tracks, areas, etc.

Control of the display boards and the filtering of data is a matter solely for the operator of the boards.

3.1.7. Passenger information interior display
(see VDV Guideline 453)

3.1.8. Journey-related connection protection
(see VDV Guideline 453)

CUS comment:

Is currently not supported by CUS.

CUS supports only the time-based subscription mechanism. Journey-based subscriptions are not supported!

3.1.9. Time-based connection protection
(see VDV Guideline 453)

3.2. Dynamic passenger information (DFI)

(see VDV Guideline 453)

3.2.1. Mission and goals

(see VDV Guideline 453 [1], Section 3.2.1 and section in this document 2.2)

3.2.2. Data supply and transfer

The information flow is fully automated.

For information on the origin and currency of the data, see Section 2.1.2

3.2.3. Display areas

(see VDV Guideline 453)

CUS comment:

The CUS DFI service does not support the direct control of displays described in VDV Guideline 453. The AZBID (as well as the ASBID) always references a complete stop (or more precisely, a service in accordance with the DiDok directory, see [4]). No additional AZBIDs (or ASBIDs) may be specified for individual stops, tracks, areas, etc.

Control of the display boards and the filtering of data is a matter solely for the operator of the boards.

3.3. Visualisation of external vehicles (VIS)

(see VDV Guideline 453)

CUS comment:

Is not supported by the CUS.

3.4. General messaging service (AND)

(see VDV Guideline 453)

CUS comment:

Is not supported by the CUS.

4. Architecture

(see VDV Guideline 453)

4.1. Communication vs. specialist services

(see VDV Guideline 453)

4.2. Reference vs. process data

(see VDV Guideline 453)

CUS comment:

The CUS VDV453 interface only supports process data (actual data)

4.3. Protocols used

(see VDV Guideline 453)

In addition to the transfers as defined in VDV Guideline 453, two new protocols are also offered in CUS, which are an addition to the VDV Guideline 453:

1. HTTPS over TLS 1.2 or TLS 1.3 as transport protocol (in combination with OAuth 2.0)
2. OAuth 2.0 (Client Credentials Grant) as authentication protocol.

For more information on connecting to CUS via OAuth, see [7].

4.4. IDs must not be interpreted *(addition in VDV-RV 453)*

With the introduction of the new Swiss IDs (SID4PT) and the necessary changes in the XSD2017 in this context, IDs may no longer be interpreted.

4.5. Change of the ID characteristic during SID4PT migration *(addition in VDV-RV 453)*

A change of the ID characteristics between non-SID4PT and SID4PT is generally only permitted after mutual agreement. If, for example, the stops of a trip are transmitted once with conventional BPUICs and in the subsequent message with SLOIDs in the same subscription (or even across subscriptions if the corresponding configuration is missing), then the trip must be discarded. In general, the trip will be discarded if there are inconsistencies regarding ID characteristics.

In particular, it must be noted in the context of SLOID migration that changes in DiDok (e.g. new SLOID) may only be taken into account by control systems on the next operating day. An unknown SLOID in a real-time trip result in the trip being discarded.

5. Basic infrastructure interface description

5.1. Subscription procedure

5.1.1. Overview

(see VDV Guideline 453)

5.1.2. Setting up subscriptions

There are some events that require all the subscriptions taken out by a client to be set up again.

Client subscriptions are set up again in the following cases:

- After the client has been restarted (e.g. after a system failure or after client maintenance work), all subscriptions that the client set on the server previously need to be deleted internally. All subscriptions must then be set up again by the client.
- After a server restart, which the client recognizes by the fact that the server start time has been updated in the status responses.
- At a time specified by the partner in question (e.g. early morning outside of normal office hours). The reason for this may be the daily initialisation of the system or a subscription refresh. It is recommended to refresh subscriptions daily. To avoid problems caused by daylight saving time, a time after 3am is considered optimal for this process.

5.1.2.1. Subscription request (*AboAnfrage*)

(see VDV Guideline 453)

Element	Comments	Field
Sender	(attribute) see VDV Guideline 453	mandatory
ZST	(attribute) see VDV Guideline 453	mandatory
AboASBRef	see VDV Guideline 453	optional CUS: [n/a]
AboASB	see VDV Guideline 453	optional
AboAZBRef	see VDV Guideline 453	optional CUS: [n/a]
AboAZB	see VDV Guideline 453	optional
AboVIS	see VDV Guideline 453	optional CUS: [n/a]
AboAND	see VDV Guideline 453	optional CUS: [n/a]
AboLoeschen	see VDV Guideline 453	optional
AboLoeschenAlle	see VDV Guideline 453	optional

Table 3: Sub-elements of <AboAnfrage>

Client side

Before the subscriptions for a service are set up for the first time, a <StatusAnfrage> (status query) is sent to the partner system. If a positive <StatusAntwort> (status response) is then received, indicating that the partner is ready to send data, the subscriptions are set up on the server side.

If there is data at the server after setting up the subscription, this must be signalled via a <DatenBereitAnfrage> [1] (data ready query, see [1], Section 5.1.3.1) or via the <StatusAntwort> (<DatenBereit> = true) (status response, data ready = true). As a response to the positive <DatenBereit> (data ready) message, the client requests the new data by means of a <DatenAbrufenAnfrage> (data query).

Server side

Since multiple subscriptions can be set up within one <AboAnfrage> (subscription query) but just one general error message is provided for the entire <AboAnfrage> (subscription query) process, the following applies in the event of an error:

- To receive a (potential) error message per subscription, a subscription must be set up individually, i.e. one <AboAnfrage> (subscription query) per subscription.
- If an error occurs when setting up or deleting a subscription, the subscription will not be set up or deleted. The partner receives an error message describing the problem in detail.
- If multiple subscriptions are set or deleted within one <AboAnfrage> (subscription query) and an error occurs, the query as a whole will be rejected, i.e. no subscription in this query will be created or deleted. In this case, the partner will receive an error message that refers to the subscription for which the first error occurred.

5.1.2.2. Subscription confirmation (*AboAntwort*)

(see VDV Guideline 453)

Note the following deviations in the <AboAntwort> type from the VDV Guideline 453:

Element	Comments	Field
XSDVersionID	(attribute, optional) version of the interface used by the server (file name of the XSD file)	optional CUS: [n/a]

Table 4: Sub-elements of <AboAntwort>

Note the following deviations in the <Bestaetigung> type from the VDV Guideline 453:

Element	Comments	Field
DatenGueltigAb	See VDV Guideline 453	optional CUS: [n/a]

DatenGueltigBis	See VDV Guideline 453 CUS as data platform – DDS (server): If it is identified that a data subscriber has supplied a subscription whose validity (<VerfallZst>) extends beyond the data horizon of CUS, the end of the data horizon is conveyed in the element <DatenGueltigBis>. When the end of the data horizon is reached, CUS will terminate the subscriptions provided.	optional
Fehlernummer	See VDV Guideline 453	optional CUS: [n/a]
KuerzMoegli-cherZyklus	See VDV Guideline 453	optional CUS: [n/a]

Table 5: Sub-elements of <Bestaetigung>

CUS as data platform – DDS (server)

The data horizon for a subscription provided ends in CUS at 23:59 on the following day (the maximum validity of a subscription provided by the data subscriber to CUS is thus 48 hours).

SBB therefore recommends that only providing subscriptions whose validity is within the above data horizon.

5.1.3. Providing data

(see VDV Guideline 453)

5.1.4. Calling up data

(see VDV Guideline 453)

5.1.4.1. Requesting data transfer (*DatenAbrufenAnfrage*)

(see VDV Guideline 453)

5.1.4.2. Transferring data (*DatenAbrufenAntwort*)

(see VDV Guideline 453)

Subscription data can be divided across multiple packets using the WeitereDaten (more data) mechanism. The data supplier can decide whether it wants to use the WeitereDaten (more data) mechanism or not.

CUS comment:

CUS is set up for 300 <Fahrplanlagen> / <FahrtLoeschen> in one packet. If this value is exceeded, the data packet should be split using the <WeitereDaten> mechanism or the packets should be transmitted at more frequent intervals. If neither of these options is possible, contact the Fachbus CUS VDV. An exception to this are the complete line timetables in REF-AUS, which must be transmitted in one packet.

CUS master data contains information on the maximum number of data structures (<FahrtLoeschen>, <Fahrplanlage>, etc.) that may be contained within one <DatenAbrufenAntwort>. If the amount of data exceeds the specified limit, only part of the

data is transmitted and the element <WeitereDaten> is set to **true**. The partner can then call up the remaining data by means of further <DatenAbrufenAnfragen>.

As specified in the original VDV Guideline 453, the data on a subscription is **not** separated here. In other words, it is theoretically possible to send messages that are larger than the configured value if all this data belongs to a single subscription.

There is currently a global threshold for this, **which applies to all partners together.**

5.1.4.2.1. Working with DatensatzAlle
(see VDV Guideline 453)

The following elements represent the most granular units of data for the different services, which must be sent in full within a data packet:

Service	Granularity (smallest unit)
REF-ANS	ASBFahrplan
ANS	ASBFahrplanlage / ASBFahrtLoeschen / HaltepositionsAenderung / WartetBis / AbbringerFahrtLoeschen
REF-DFI	AZBFahrplan
DFI	AZBFahrplanlage / AZBFahrtLoeschen
REF-AUS	Linienfahrplan
AUS	IstFahrt

Table 6: Services

5.1.5. Deleting data subscriptions (AboLoeschen/Alle)
(see VDV Guideline 453)

5.1.6. Resetting after interruption
(see VDV Guideline 453)

5.1.7. Resetting after crash
(see VDV Guideline 453)

The optional <DataVersionID> sub-element of the <StatusAntwort> element must not be evaluated for subscription-related behavior control of a client. As soon as the server transmits a new <StartDienstZst> in the <StatusAntwort>, it must be assumed that all subscriptions are lost, regardless of whether the <DataVersionID> element exists or is filled. The client must therefore delete and restart them if further data is required.

5.1.8. Alive handling
(see VDV Guideline 453)

Siehe auch Kapitel 5.1.7 bezüglich dem Wiederaufsetzen der Abos nach einem Absturz.

5.1.8.1. Query (StatusAnfrage)
(see VDV Guideline 453)

5.1.8.2. Response (StatusAntwort, Status)
(see VDV Guideline 453)

Client side
If a client receives a "notok" back in the `<StatusResponse>` in the `<Status>` data element due to a made `<StatusRequest>` (status reply), it should be assumed that the entire service is not available. From this point, the client is not allowed to send any more queries to the partner system except for `<StatusAnfragen` > (status queries) that take place on a cyclical basis. As soon as the first `ok` is received in a `<StatusAntwort>`, the service in question is considered "available again" and regular data exchange can be resumed. The behaviour is no different from when absolutely no reply is received to a `<StatusAnfrage>`.

5.1.8.3. ClientStatusAnfrage
(see VDV Guideline 453)

CUS comment:
The `<ClientStatusAnfrage>`, which enables a server to check whether a client is still "alive", is currently not supported by the CUS.

5.2. HTTP binding

5.2.1. Procedure

XML namespace: An explicit namespace (e.g. *vdv453ger*) is not used, pursuant to the official VDV Guideline 453.

XML header: The XML header must be completed as per HTTP specification RFC 2616.

CUS comment:
In addition to the points described in VDV Guideline 453, the following applies:

CUS as data platform – DDS (client)
A partner's target address (IP and port) is held in the VDV interface configuration. It must also be specified and mutually agreed when setting up the OAuth connection. The possible redundancy of the clients within the SBB cluster environment is of no relevance to the partners' servers.

CUS as data platform – DDS (server)
The logical address (IP and port) of the load balancer responsible for routing the incoming HTTP requests must be specified as the destination address. When setting up the OAuth connection, the IP and port number must be agreed with the network specialists of both partners early on in the implementation phase.
The redundancy of the server is irrelevant for a client, as it does not address the SBB target server directly but sends its requests to the upstream load balancer. It is not possible to address the SBB server directly (see also 5.3).

5.2.2. Character set

(see VDV Guideline 453)

5.2.3. Service IDs

(see VDV Guideline 453)

CUS comment:

CUS supports the following VDV453 services:

Service	Identifier or {dienstTyp}	Description
Process data service Connection protection (ANS)	ans	Provides current live data on feeders on the server side. These are processed on the client side in the connection protection system.
Process data service Passenger information (DFI)	dfi	Provides passenger data information on the server side. This is then shown on the associated client-side displays.

Table 7: HTTP service identification or URL parameter {dienstTyp}

5.2.4. Query URL

Since changes within a partner's system environment, which also acts as a server, can also affect application addressing, it is advisable to design the addressing of VDV queries so that they are configurable on the client side.

Changes to the URL of a service on the server side must be approved by the recipients.

Server side

Servers send and respond to the following messages:

Query ID	Responded to by the server	Sent by the server
status.xml	✓ **StatusAntwort**	✗
Clientstatus.xml	✗	✓ **ClientStatusAnfrage**
aboverwalten.xml	✓ **AboAntwort**	✗
datenbereit.xml	✗	✓ **DatenBereitAnfrage**
datenabrufen.xml	✓ **DatenAbrufenAntwort**	✗

Table 8: Server messages

Client side

Client sends and respond to the following messages:

Query ID	Responded to by the client	Sent by the client
status.xml	✗	✓ **StatusAnfrage**
Clientstatus.xml	✓ **ClientStatusAntwort**	✗
aboverwalten.xml	✗	✓ **AboAnfrage**
datenbereit.xml	✓ **DatenBereitAntwort**	✗
datenabrufen.xml	✗	✓ **DatenAbrufenAnfrage**

Table 9: Client messages

CUS comment:
Due to the system landscape within SBB, the addressing procedure described in VDV Guideline 453 must be extended. As the interface is within a "shared platform", the application responsible for the request must be stated within the address. The current information is available in the SBB developer portal.

The full parametrisation URL consists of the following:

```
{baseUrl}[:{port}]/{applikationsPfad}/{partnerName}/{dienstTyp}/{nachrichtenTyp}.xml
```

With the current parameters or supported services being:

- **{baseUrl}** = `https://vdv-xsd2017.api.sbb.ch`
- **{port}** = `443`
- **{applikationsPfad}** = `kihub/kivdv`
- **{partnerName}** = (control centres and source identifiers; see Section 6.1.3 later in this document)
- **{dienstTyp}** =
  - `aus`
  - `ausref`
  - `dfi`
  - `ans`
- **{nachrichtenTyp}** =
  - `aboverwalten`
  - `status`
  - `datenbereit`
  - `datenabrufen`

The parameter {nachrichtenTyp} is self-explanatory. An `<AboAnfrage>` by the partner client must, for example, be sent to the /aboverwalten.xml endpoint, etc. (`<*Anfrage>` and `<*Antwort>` are always combined). The image below shows the various endpoints:

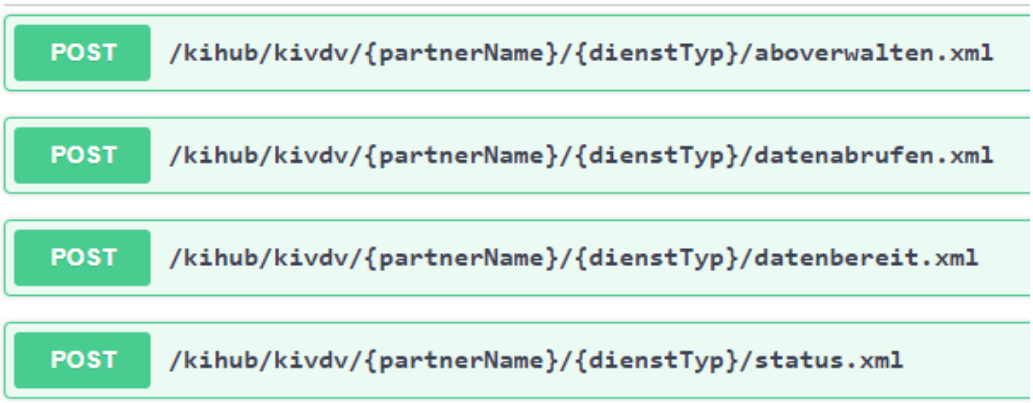


Fig. 1: The various endpoints of the CUS VDV v2017c interfaces.

Note:

- Since changes within a partner's system environment, which also acts as a server, can also affect application addressing, it is a good idea to design the addressing of VDV queries to be configurable on the client side.
- Unlike the VDV Guideline 453, SBB does not support server-side alive handling either as a server or a client. This means that the `<ClientStatusAnfrage>` or `<ClientStatusAntwort>` cannot be sent or responded to.

5.2.5. Error handling

(see VDV Guideline 453)

5.3.

Both sides are responsible for implementing protective measures (e.g. DMZ, firewall, etc.). Appropriate security components must be used here. The demilitarised zones (DMZs) of the public transport partners form the infrastructure for the setup of a VPN and the routing of HTTP requests. The level of security desired or required for the respective connection must be agreed upon bilaterally by the partners.

6. "Business services" interface description

6.1. General stipulations

The following sections describe the metadata required for data exchange and provide more detail for VDV Guideline 453 [1].

Metadata that is neither defined in this document nor in the official VDV Guideline must be agreed upon and defined by the relevant partners.

CUS comment:

The master data is configured via the SBB master data tool. Changes to the configuration are made by mutual agreement.

6.1.1. Operating days

The operating day for a journey defines its relationship to a specific date:

- The operating days **must** match the days on the period timetable (number of travel days).
- The operating day usually matches the date of departure for the journey at the start operating point according to the timetable.
- For journeys that start after midnight, the operating day may be the previous day.
- The timetable planner can assign a journey to one or the other day based on operational needs. There are no fixed rules in this case.
- A journey always retains its assigned operating day regardless of the duration of the journey.

Note on the CUS date format:

The SBB sends the operating day information as a date only without any time information, although it deviates from UTC time (e.g. 2014-05-19+02:00). This is in compliance with ISO8601. In the case of incoming data, the sender may freely select the format as long as the ISO standard is adhered to.

6.1.2. Date and time format

(see VDV Guideline 453)

CUS comment:

CUS sends an expects to receive all time information unrounded and to the nearest second. Time information accurate to the nearest second is required for subsequent calculations and controls.

6.1.3. ITCS identifier

The ITCS ID is included in both the access URL and in the message itself in the form of the

In addition to the **sender of a message** (system ID), the ITCS ID also identifies the **platform** from which a message is sent (platform ID). Both components are connected with a "_" (underscore sign) between them:

<Systemkennung>_<Plattformkennung>

It is recommended to specify the ITCS identifier in lowercase letters.

The system ID can be freely selected. The underscore sign "_", however, must not be used within the system ID. It is a good idea to specify in the system ID the respective abbreviations for the partner and, if necessary, the abbreviation for the system designation (e.g. sbb, aags, riv, zvv, zvb, sip_hub, etc.).

The platform from which data is exchanged is specified in the platform ID.

The following IDs are defined as standard: Platform Platform ID:

Platform	Platform ID
Development	entw
Test	test
Integration	int
Production	prod

Table 10: Platform IDs

If the platform IDs defined here are not sufficient, more IDs can be added with the agreement of both sides. Partners that operate fewer than the platforms listed here are limited to the ones they have available.

„Valid ITCS IDs include, for example: zvv_test, zvv_prod, riv_prod, sbb_int, sbb_prod, sip_hub_test, sip_hub_prod.

CUS comment:

SBB supports these four platforms.

CUS as data platform – DDS (client)

This results in the source identifiers shown below for the SBB platforms:

Platform	Source identifier
Development	sbb_entw
Test	sbb_test
Integration	sbb_int
Production	sbb_prod

Tabelle 11: Senderkennungen von CUS

CUS as data platform – DDS (server)

The example below shows the partner source identifiers for the four possible platforms of the Zurich Transport Network (ZVV) partner. The source identifiers for other partners are formed in the same way.

The source identifiers for the (possible) ZVV platforms are shown below:

Platform	Source identifier
Development	zvv_entw
Test	zvv_test
Integration	zvv_int
Production	zvv_prod

Table 12: Source identifiers of the partner platforms (ZVV)

6.1.4. Location references

Location identifiers for the ANS and DFI services are based on the respective connection areas (ANS) and display areas (DFI) for which a subscription is set up.

Service	Location identifier	Key name
Connection protection	Connection area	ASBID
Dynamic passenger information	display area	AZBID

Table 13: Location references in the specialist services

The AZBID and ASBID for a stop (i.e. for an operating point defined in DiDok) is supported by all partners in Swiss public transport. Finer granularities such as AZBID / ASBID for a specific platform / stop must be agreed bilaterally.

6.1.4.1. Format for ASBID / AZBID without SLOID (addition in RV 453)

Until the changeover to the SLOID (according to separate migration planning), each system must deliver the ASBID / AZBID in the format described here.

For technical reasons, different prefix codes are given to the subscription queries for individual services:

- a leading **Z** for the AZBID of the DFI service
- a leading **S** for the ASBID of the ANS service

In both cases, what follows is the two-digit UIC country code and the five-digit UIC code (without check digit) for specifying the stop.

AZBID = Z + UIC-Country-Code + UIC-Code
ASBID = S + UIC- Country-Code + UIC-Code

The UIC country codes and the UIC stop codes for the local references also apply to bus stops, streetcar stops, etc. They are based on the Switzerland-wide operating point list (master data DIDOK [4]). Note: in CUS, the AZBID always corresponds to a specific stop. The AnzeigerBereichs-Code (display area code) is not supported. CUS provides the location

references (also for bus stops, tram stops, etc.) based on the Switzerland-wide operating point list (master data DIDOK [4]) in the master data (see also Section 3.2.3).

6.1.4.2. Format for ASBID / AZBID with SLOID (addition in RV 453)

After the changeover to the SLOID (according to separate migration planning), each system must supply the ASBID / AZBID in the SLOID-based format described here.

The prefixes Z or S for AZBID or ASBID are no longer specified. The two IDs correspond one-to-one to the SLOID of the respective stop.

AZBID = SLOID **ASBID = SLOID**

6.1.5. *Journey reference (FahrtID)*

The `<FahrtID>` (journey ID) must be specified (applies to all VDV453 and VDV454 services) and is used to uniquely identify a transmitted journey and compare it to existing data on this journey (if possible, also to planning data from INFO+).

The `<FahrtID>` (journey ID) element consists of the two subelements `<FahrtBezeichner>` (journey identifier) and `<Betriebstag>` (operating day):

Element	Comments	Field
- FahrtBezeichner (journey identifier)	Unique journey identifier (see below)	**Mandatory**
- Betriebstag (Operating day)	(see Section 6.1.1)	**Mandatory**

Table 14: **Structure of `<FahrtID>`**

6.1.5.1. Format for journey identifier without SJYID (addition in VDV RV 453)

Until the changeover to the SJYID (according to separate migration planning), each system must transmit the `<FahrtBezeichner>` (journey identifier) in the format described below and it must always be unique within an operating day. The `<FahrtBezeichner>` must be consistent in all VDV453/454 services!

FahrtBezeichner = [UIC- LänderCode]:[GO-Nummer]:[Fahrt-Referenz]

The individual components of the trip identifier are defined as follows:

Identifier	Meaning	Example
UIC-LänderCode (UIC country code	The country code of the transport undertaking (as per UIC) operating the journey. Numeric value with max. 2 digits	85

Identifier	Meaning	Example
GO-Nummer (business organisation number)	Number of the business organisation of a transport company operating the journey, as per the FOT DiDok list [4] or reference for the country in question. (Synonym: TU-Code, or transport company code) The number should not start with a leading zero. Max. six-character alphanumerical value (permissible characters are { A-Z, a-z, 0-9, _ }). The GO-Nummer (business organisation number) must be identical in the FahrtBezeichner (journey identifier) and LinienID (line ID) elements. If the numbers are different, it may not be possible to process the journey (inconsistencies).	37
Fahrt-Referenz (Journey reference)	Open key that can be defined by the data producer or planning transport company itself in order to ensure that a journey is unique. The journey reference must be unique within the business organisation of a transport undertaking (business organisation number) and must refer to one journey per `<Betriebstag>` (operating day). Max. **50-character, alphanumerical value** permitted. Permissible characters are { A-Z, a-z, 0-9, _ , - }. **Note:** The colon (:) is a special separator and is therefore explicitly not permitted in this field (except for rail transport).	6624325-234-001_A
	Composition of FahrtReferenz (journey reference) for rail transport For compatibility reasons the following format is used in rail transport for the "journey reference" field: **FahrtReferenz = [VM-Fahrtnummer (transport journey number)]:[Erweiterte Referenz (extended reference)]** Permissible characters are { A-Z, a-z, 0-9,“ „,“-„}. **Note:** The colon (:) is a special separator and is therefore explicitly only permitted in this field at the point defined above (solely for rail transport).	63003:001

Identifier	Meaning		Example
	VM-Fahrtnummer (transport journey number)	This must be unique within the business organisation of a transport company (GO-Nummer, or business organisation number) for one operating day. Multiple journeys within the same day must be identified by different transport journey numbers. A **max. 5-character numerical value is permitted.**	63003
	Erweiterte Referenz (Extended reference)	An alphanumerical technical key that can be defined by the planning transport company itself to ensure that a journey is unique. This value is also used for identification if the journey cannot be made unique using only the key elements described above. If this key is not used for differentiation, the **placeholder 000** must be used. Permissible characters are {A-Z, a-z, 0-9, _ , - }.	001

Table 15: Components of `<FahrtID>`

Examples of a correctly formatted FahrtBezeichner:

SBB: 85:11:21814:001
NAV: 85:846:241291-00319-1
International: 80:678:439244-DR24-434-223_01

Example for FahrtID (journey reference):

```
<FahrtID>
      <FahrtBezeichner>85:11:21814:001</FahrtBezeichner>
      <Betriebstag>2012-05-14+02:00</Betriebstag>
</FahrtID>
```

CUS as rail data producer – DPB (client/server)

As a rail data producer, CUS expects the `<FahrtBezeichner>` as defined in this document and always delivers it in this format for trains. Old formats for existing connections are still accepted.

6.1.5.2. Format for journey identifier with SJYID (addition in VDV RV 453)

After the changeover to the SJYID (according to separate migration planning (see also chapter 4.5) each system must send the <trip identifier> according to these specifications. Furthermore, the `<FahrtBezeichner>` must always be unique within an operating day. The `<FahrtBezeichner>` must match in all VDV453/454 services and INFO+!

FahrtBezeichner = SJYID

The SJYID is described in [7].

6.1.6. Line and direction references

6.1.6.1. Format LinienID without SLNID (Addition in VDV-RV 453)

The <LinienID> (line ID) is a purely technical key not used for the customer information display.

Formatting in the Swiss public transport system (except for rail traffic):
In the Swiss public transport system (except rail transport), the LinienID (line ID) must be provided in the following format for all VDV453 and VDV454 services:

[**UIC-Ländercode**]:[**GO-Nummer**]:[**Technischer Linienschlüssel**]

Identifier	Meaning	Example
UIC-LänderCode (UIC country code)	The country code of the transport undertaking (as per UIC) operating the journey. Numeric value with max. 2 digits	85
GO-Nummer (business organisation number)	Number of the business organisation of a transport company operating the journey, as per the FOT DiDok list [4] or reference for the country in question. (Synonym: TU-Code, or transport company code.) Number should not start with a leading zero. Max. six-character alphanumerical value (permissible characters are { A-Z, a-z, 0-9, _ }). The GO-Nummer (business organisation number) must be identical in the <FahrtBezeichner> (journey identifier) and <LinienID> (line ID) elements. If the numbers are different, it may not be possible to process the journey (inconsistencies).	37
Technischer Linien-Schlüssel (technical line key)	Technical key for the line. The line key must be unique within the business organisation number (GO-Nummer). Alphanumerical number (permissible characters are {A-Z, a-z, 0-9, "_" }).	1250_2

Table 16: Format for <LinienID> without SLNID

Please note: With the format described above, the <LinienID> (line ID) itself is uniquely defined in the Swiss public transport system across countries and business organisations.

Recommendation: The KIDS working group recommends using a unique <LinienID> (line ID) based on the above format when transmitting the period timetable (e.g. HRDF), the day target timetables (REF-AUS) and also when transmitting changes during a day (AUS). The aim is to be able to avoid <LinienID> (line ID) mappings in the information systems in future.

In the Hafas raw data format (HRDF), HaCon explicitly stipulates the use of the <LinienID> (line ID) in the line key for this purpose from format version 5.40.0.

Example for specifying the <LinienID> (line ID) in VDV454 and HRDF (from 5.40.0):

VDV454	HRDF (from version 5.40.0)
LinienID= "**85:827:2"**	Linien-Schlüssel= "1234567K**85:827:2"**

Comment on migration path: During transition, the <LinienID> (line ID) may still be operated in accordance with existing metadata agreements in terms of VDV453 services. The format of the <LinienID> (line ID) should be converted in the VDV453 service by the transport company within a reasonable amount of time. The <LinienID> (line ID) must be transmitted identically in the format defined above for all services at the latest when the VDV454 services or the new IDs (SID4PT) are used.

Formatting of the <LinienID> (line ID) for rail traffic:
In rail transport, the <LinienID> (line ID) is handled differently for the VDV453 and VDV454 services until further notice. In the VDV453 services, the metadata agreed between the partners is transmitted. In the VDV454 services, the journey number (normally the train number) for the journey in question is transmitted in the <LinienID> (line ID) element.

CUS comment:

CUS as rail data producer – DPB (server)
The available line IDs per operating point are held by the master data. These determine which lines can be subscribed to which operating points.

6.1.6.2. Format LinienID with SLNID (Addition in VDV-RV 453)

The specification of the <LineID> is mandatory (applies to all VDV453 and VDV454 services) and serves the unique identification of a line in the line directory of Swiss public transport. The <LineID> is a purely technical key that is not used for customer display (see instead the <LineText> in the following section).

After the changeover to the SLNID (according to separate migration planning (see also chapter 4.5), each system must send the <LineID> according to these specifications. The <LineID> must match in all VDV453/454 services and INFO+!

LinienID = SLNID

The SLNID is described in [7].

6.1.6.3. LinienText (line text): (Addition in VDV-RV 453)

The <LinienText> (line text) element is of relevance to customers and must therefore be forwarded to the appropriate display systems.

6.1.6.4. Direction reference (Addition in VDV-RV 453)

The <RichtungsID> (direction ID) defines the direction of a journey and is a purely technical key that is not used for customer display. This can change from operating point to the next during

the journey[3]. The <RichtungsID> (direction ID) for a journey can therefore change between stops. It is recommended to use a RichtungsID (direction ID) that is meaningful and easy for human observers to interpret[4].

CUS comment:

CUS as rail data producer – DPB (server)

Specifics of the ANS & DFI services

CUS defines the <RichtungsID> (direction ID) per operating point for **trains**. It is made up of two official operating point abbreviations (according to DIDOK). Different RichtungsIDs are generated for the ANS and DFI services.

Service	Formula for <RichtungsID>
ANS	[previous stop]-[current stop]
DFI	[current stop]-[next stop]

Table 17: Formula for <RichtungsID>

For example: A train at the Emmenbrücke (EBR) operating point, whose previous stop is Luzern (LZ) and next stop is Emmenbrücke Gersag (GSAG), receives the <DirectionID> LZ-EBR in the ANS service and EBR-GSAG in the DFI service.

This formula, and in particular the distinction between ANS and DFI, has the benefit that the same <DirectionID> is always used even in the event of a disruption, e.g. for replacement trains with a route that deviates from that of the original train.

All available <RichtungsID> are held in the master data for each operating point and LinienID.

6.1.6.5. Specifying intermediate stations ((Via elements)) (Addition in VDV-RV 453)

For reasons of compatibility, intermediate destinations should always be stated in the Via element and the ViaHst1Lang, ViaHst2Lang and ViaHst3Lang elements. The Via element always has higher priority.

CUS comment:

The intermediate stations of a vehicle are specified by the <ViaHst1Lang> element. CUS sends and expects to see the intermediate stations separated by a semicolon together with a priority.

The Via information format thus results in:

Prio1;ViaHst1;Prio2;ViaHst2;…;Prio<n>;ViaHst<n>

[3]While the RichtungsID (direction ID) remains constant for a journey in linear local transport, it may change multiple times during the journey in rail transport.

The RichtungsID (direction ID) is not intended for passenger information. However, it should have a structure that is meaningful and easy for human observers to interpret. This makes it easier to understand the metadata and analyse log files

[4] Among other things, this facilitates the understanding of metadata and the analysis of log files.

The following also applies.

- Priority allows the party displaying the message to simplify the selection of Via texts in the event that they have insufficient space for all the Via information. The lower the specified priority value, the higher the priority of the stop. CUS limits the priority value range to [1, 998] in the range of natural whole numbers.
- When showing future VIAs, only those operating points where passengers can also alight should be shown. Regional traffic identifiers are normally used with regional services (e.g. Zürich Stadelhofen => Stadelhofen).
- CUS transmits up to a maximum of 6 of the vehicle's next operating points. These are determined on the basis of their priority and are listed in journey order. Measures are in place to ensure that the next operating of interest to the customer is the first Via.

6.1.7. Product types

(see VDV Guideline 453)

The transport category is communicated as the `<ProduktID>` [5] (product ID) in the Swiss public transport system.

When specifying the `<ProduktID>` (product ID), the data-producing transport company must ensure that the transmitted transport categories match the transport categories used in the time-table collection in the Swiss public transport system (INFO+).

Note

- Specifying the ProduktID (product ID) is partly used for the assignment of pictograms in the information systems.
- The current transport categories can be found on the home page of Alliance Swiss Pass [5]. The use of German-language values, incl. upper and lower case, are mandatory and must be adhered to in Swiss public transport whenever possible.
- Nonetheless, the values for the transport category may change at short notice and sometimes even without any notice. Recipient systems should therefore be able to respond rapidly to such changes and must not discard data with unknown transport categories.

CUS comment:

CUS as rail data producer – DPB (client)

Is not used by SBB as a rail data produce.

6.1.8. Diversions

See VDV Guideline 453

The definition of the stop sequence counter (`<HstSeqZaehler>`[5]) when there are multiple visits to a stop.

[5] In the event of a double visit, i.e. when a stop is visited on more than one occasion (e.g. - Hardbrücke - Zürich HB – Hardbrücke -). According to VDV Guideline 453, strictly in ascending order.

6.1.9. Service attributes

Attributes and notes (see [5]) are transmitted via service attributes. The following values are defined in the Swiss public transport system:

Name of the service attribute	Meaning	Remarks
NF	Low Floor: The value 1 is set if the vehicle used is BehiG-compliant and thus generally enables level entry and exit. This is generally the case if collectively: a. The vehicle or at least one car is "low-floor", i.e., the vehicle floor height in the door area is such that level access/exit is possible at BehiG-compliant stopping point (e.g., with a height of 22 cm in bus traffic) (i.e., independently or with spontaneous support from the driving personnel). b. Spontaneous boarding aids (usually extendable or foldable ramps) are available if residual gaps or varying stopping point heights must be compensated. c. Vehicle has no steps in the boarding area. d. Clear width of the doors in the low-floor boarding area (and possibly in the passageways) is greater than the minimum value required by law.	Implementation deadline for the inclusion of BehiG in the inventory, i.e. 31.12.2023. Attention: This requirement applies exclusively to TUs which have non-accessible vehicles in operation after the expiry of the BehiG deadline (i.e. which have neither NF nor HL characteristics) and which can operate these vehicles on other routes/lines at short notice (short notice means hours/days before the start of the journey or which can no longer be handled via the timetable).
HL	Lift: The value 1 is set if the vehicle used (usually high-floor) is equipped with an integrated lift that can be operated spontaneously by the driving personnel and allows entry/exit at any stopping point height (without prior notification). In addition, the requirements c. and d. of the definition NF apply.	See NF
PH	No low floor	
(… to be defined by INFO+)	Autonomous and spontaneous access for manual and electric wheelchairs.	Phase 2, implementation between interested partners
(… to be defined by INFO+)	Access for manual and electric wheelchairs with advance notice	Phase 2, implementation between interested partners
(… to be defined by INFO+)	Limited access for manual and electric wheel-chairs	Phase 2, implementation between interested partners
(… to be defined by INFO+)	Limited access for manual and electric wheelchairs.	Phase 2, implementation between interested partners

Z	Supplement payable	Phase 2, implementation between interested partners
TX	Taxi	Phase 2, implementation between interested partners
TT	Tilting technology	Phase 2, implementation between interested partners

Table 18: Values for `<ServiceMerkmale>`

Clarification: Service attributes NF and PH are to be considered independent, so that no NF does not automatically mean a high floor.

Service attributes value	Meaning	Remarks
NF vorhanden (NF exists)	Value 1 = low floor Value 0 = not low floor	
NF fehlend (NF missing)	No information on low floor	uneven high floor
PH vorhanden (PF exists)	Value 1 = high floor Value 0 = not high floor	
PH fehlend (PH missing)	No information on high floor	uneven low floor

Table 19: Special values for `<ServiceMerkmale>`

CUS as data platform – DDS (client server)

All elements supplied are passed on.

CUS as rail data producer – DPB (server)

Not supported by CUS as rail data producer. Exact position in the train wagon of BehiG properties such as wheelchair accessibility are transmitted within the structure IstFormation.

6.1.10. Error in technical shift

(see VDV Guideline 453)

6.1.11. Optional fields

(see VDV Guideline 453)

6.1.12. Text for publication

(see VDV Guideline 453)

6.1.13. Latency and processing analysis using the protocol entry element

(see VDV Guideline 453)

The `<Protokolleintrag>` (log entry) does not need to be sent, evaluated, added or forwarded in the Swiss public transport system. However, if a `<Protokolleintrag>` (log entry) is received, an XSD validation error must never be triggered.

6.1.14. Stop information (addition in VDV-RV 453)

6.1.14.1. HaltepositionsText (stopping position text)

The <HaltepositionsText> (stopping position text) element describes the transport stop used by a vehicle in a format ready to display to the customer. The content of this field is therefore relevant to publication (vehicle's interior display, general monitor, etc.).

The official stop designation (e.g. "A" for the bus stop of the same name or "12" for the corresponding track) should be transmitted if available. If the departure location cannot be uniquely identified, the field is not transmitted.

Implementation instruction:

The text length for fields is limited to 6 characters in the Swiss public transport system.

The value is interpreted as follows if the element is filled:

- Value without spaces:
  ➔ The value is adopted as the actual track or actual stop.
- Value with spaces:
  ➔ Values with spaces are permitted only for trains.
  ➔ The space is interpreted as a separator between the actual track and the actual sector. The text before the space will be interpreted as the track; the text after the space as the sector (e.g. "12 A refers to track 12 and sector A).

If tracks and/or sectors are transmitted together with <HaltepostionsText> (stopping position text), the tracks and/or sectors have a higher priority. If <HaltepostionsText> (stopping position text) is missing, <AbfahrtssteigText> and <AbfahrtsSektorenText> must be converted to <HaltepositionsText> (stopping position text) when converting to the older XSD version. When converting from an older XSD version, there is no conversion from <HaltepositionsText> (stopping position text) to SteigText (bay text) and/or SektorenText (sector text).

6.1.14.2. Bays (AnkunftssteigText, AbfahrtssteigText): (Addition in VDV-RV 453)

For rail travel, the Steig (bay) corresponds to the track identifier, without the sector. This is normally a number.

Both elements must be transmitted with their content whenever possible.

6.1.14.3. Sectors (AnkunftsSektorenText, AbfahrtsSektorenText): (Addition in VDV-RV 453)

The following format must be observed in rail travel:

Sectors are specified in the following format to save space:

- Letters A to Z, max. three-characters without spaces (e.g. "ABC")
- For more than three letters, describe as a range with a hyphen (e.g. "A-D, corresponds to "ABCD")

This is to be ensured by the source systems (INFO+, CUS, VDV supplier partners, etc.).

Sectors only have to be transmitted if the stopping point deviates from the usual location (e.g. two trains at the same platform).

6.1.14.4. HaltID without SLOID

(see VDV Guideline 453) The <HaltID> (stop ID) element defines the stop or the stopping point to which a vehicle travels.

Format:

Until the changeover to SLOID (according to separate migration planning), each system must supply the <HaltID> in the format described here.

The <HaltID> (stop ID) should be specified in as much detail as possible, if available, and should be treated the same in the application of Guidelines VDV453 and VDV454. It should be structured as follows:

- unique, two-digit UIC country code for Switzerland
- the five-digit UIC code (without check digit) for specifying the stop in question.
- (Optional) two-digit stop code for identifying the stopping point at the stop in the form of a natural number with leading zero ("01", ... "99") to identify the breakpoint within the stop. The stop code must correspond to the BEZEICHNUNG_BETRIEBLICH of the stop edge in DiDok [4]. Attention: the designation in DiDok [4] is managed without leading zero.

If there are several stops within a stop, the two-digit stop code can be used to identify and distinguish the exact position. Attention: in the case of stops that are served by several transport companies, the stop code or the BEZEICHNUNG_BETRIEBLICH in DiDok [4] must be identical and thus agreed upon. If the subdivision within stops is not needed and the stop position corresponds to the stop itself, the two-digit stop code must not be specified, e.g. "00" is not allowed. The resulting code for the <HaltID> is thus usually seven digits (<HaltID> corresponds to stop globally), but can also be nine digits if used in a fine-granular way (<HaltID> corresponds to a concrete stop).

Composition of <HaltID>:

UIC country code + UIC code+ (stopping point code)

Example for Zürich HB:8503000, 850300002

The UIC country codes and UIC stop code for identifying the stop also apply to bus stops, tram stops, etc. They are based on the Swiss-wide operating point list (according to the DiDok list of the BAV [4]).

The <HaltID> is also now being transmitted for rail traffic. The track without sector is transmitted in the Ankunfts-/AbfahrtsSteigText.

CUS as rail data producer – DPB (client/server) **and NAV with connection monitoring**

The <HaltID> contains the technical identifier for the stop/boarding area. It is used to determine the particular stopping area and, along with the Ankunfts-/AbfahrtsSteigText (Arrival/Departure platform text) in rail traffic, the track-specific or bay-specific transfer time for the connection calculation. Only identifiers compliant with the master data may be transmitted in this element, as the transfer times are defined in the master data. Otherwise, is would not be possible to carry out the connection time calculation accurately.

6.1.14.5. Halt with SLOID

(see VDV-Schrift 453)

The <HaltID> element defines the stop or the stopping point at which a vehicle operates.

Format:

After the changeover to SLOID (according to separate migration planning), each system must supply the <HaltID> in the format described here.

The <HaltID> shall be specified in the finest granularity available, if possible, and shall also be handled in the same way in the application of the VDV453 and VDV454 fonts.

<HaltID> = **SLOID**

Depending on the system and the application, the SLOID of the stop or the SLOID of the landing/stop is specified. See also chapter 4.5

During migration, recoding between conventional format and SLOID is provided using DiDok [4] lists of services and transportation point elements as follows:

a. StopID 7 digits -> DiDok DB field BPUIC directly provides SLOID of the stop.
   No match -> trip is discarded.
b. HaltID 9-digit -> the first 7 digits are interpreted as BPUIC and the last two digits are interpreted as BEZEICHNUNG_BETRIEBLICH. Both DB fields together provide the corresponding stop edge or its SLOID.
   No match -> trip is discarded.

CUS as rail data producer - DPB (client/server) **and NAV with connection monitoring**.

The <HaltID> element contains the technical designation of the stop/stop edge. This is used to determine the associated stop area and, in rail traffic, together with the arrival/departure platform text, the track-accurate or edge-accurate transfer time for the connection calculation. Only designations according to the master data in this element may be transmitted, since the transfer times are defined in the master data and otherwise the connection time calculation can only be inaccurate.

6.1.14.6. Durchfahrt (non-stopping pass)

The <Durchfahrt> (non-stopping pass) element must be interpreted. The <Durchfahrt> element does not appear in older XSD versions. When converting to an old XSD version, a xxxFahrtLoeschen (delete journey) element with <Ursache=Durchfahrt> (cause=non-stopping pass) is also transmittedSs as well as a xxxFahrplanlage (timetable situation) element. When converting from an older XSD version, it is not possible to generate the <Durchfahrt> (non-stopping pass) element. It is not set.

6.1.14.7. Einsteigeverbot (no boarding)

The <Einsteigeverbot> (no boarding) element must be interpreted. The arrival and departure times are provided. The <Einsteigeverbot> (no boarding) element does not appear in older XSD versions. When converting to an old XSD version, <AbfahrtszeitAZBPlan> and <AbfahrtszeitAZBPrognose> are omitted. When converting from an older XSD version, it is not possible to generate the <Einsteigeverbot> (no boarding) element. It is not set.

6.1.14.8. Aussteigeverbot (no alighting)

The Aussteigeverbot (no alighting) element must be interpreted. The arrival and departure times are provided. The Aussteigeverbot (no alighting) element does not appear in older XSD versions. When converting to an old XSD version, AbfahrtszeitAZBPlan and AbfahrtszeitAZBPrognose are

omitted. When converting from an older XSD version, it is not possible to generate the Aussteige-verbot (no alighting) element. It is not set.

6.1.15. Arrival information (AufASB/AufAZB) (Addition in VDV-RV 453)

The two elements `<AufASB>` and `<AufAZB>` are used within a timetable system to indicate for the service in question whether a means of transport has reached the operating point in question or if it is highly likely to reach it at the stated time:

- `<AufAZB>`: in the DFI service, if this field is `true`, this means that the vehicle is waiting at the operating point (i.e. passengers can board) at the predicted time stated (`<AnkunftszeitAZBPrognose>`).
- `<AufASB>`: in the ANS service, if this field is `true` this means that the means of transport has reached the operating point (i.e. passengers can alight) at the predicted time stated (`<AnkunftszeitASBPrognose>`).

The arrival (value = "true") of a journey must be transmitted consistently and reliably in order to ensure correct displays (customer information) and functional connections.

For the `<AufASB>` and `<AufAZB>` elements the default value is set to `false` . A missing `<AufASB>` or `<AufAZB>` element therefore indicates that the means of transport has not reached the operating point yet.

The elements are set to `true` as soon as the arrival prediction for the means of transport can be interpreted as the effective arrival time at the operating point (technically this element is set to `true` by SBB, for example, as soon as the referenced means of transport passes the home signal at the operating point in question). In this case, the arrival prediction is the anticipated ACTUAL arrival time.

6.2. Connection protection (REF-ANS, ANS)

(see VDV Guideline 453)

6.2.1. Introduction

(see VDV Guideline 453)

6.2.2. Operational data supply and maintenance

(see VDV Guideline 453)

6.2.3. Reference data service (REF-ANS)

(see VDV Guideline 453)

CUS comment:

Not supported by CUS.

6.2.3.1. Data sharing

(see VDV Guideline 453)

6.2.3.2. Requesting area timetables (AboASBRef)

(see VDV Guideline 453)

6.2.3.3. Transmitting area timetables (ASBFahrplan)
(see VDV Guideline 453)

6.2.3.3.1. Additional information on the journey (FahrtInfo)
(see VDV Guideline 453)

Deviations from and clarifications to the VDV Guideline 453 are:

Element	Comments	Field
KursNr (run number)	See VDV Guideline 453 (the <KursNr>, or run number, for local services is not the published journey number but the VDV Kursnummer, or run number) CUS as rail data producer – DPB (server) Corresponds to the transport number for rail traffic. The SBB transmits the <KursNr> (run number), which contains the transport number of the vehicle in question (in the case of railways, this is always the train number (ZN).	optional
LinienfahrwegID / Line route ID)	see VDV Guideline 453	optional
ProduktID (product ID	see VDV Guideline 453 Unique reference to the product (boat, bus, train, etc.)	**mandatory**
BetreiberID (operator ID)	see VDV Guideline 453 The operator ID element always contains the transport company (GO number according to DiDok GO list[4]) that has been commissioned (by the FOT, canton, etc.) to operate this trip and holds the concession for it. Note: An operator can deliver either rail or local transport services data with a <BetreiberID>. If an operator needs to deliver both rail and lo-al transport data, this must be delivered with a different <BetreiberID> (operator ID) even if both use the same line. Special predefined operator IDs should be used for replacement rail services in consultation with the BAV.	**mandatory**
Betreiber (Operator)	Contains the concessionaire (operator (abbr.)), the TU_ABKUERZUNG field of the DiDok GO list [4], determined via the unique TC code. TU_NUMMER field of the DiDok GO list [4].	optional

Table 20: Structure of <FahrtInfo>

CUS as data platform – DDS (client server)
All elements are supported.

CUS as rail data producer – DPB (server)
Only the following elements are supported:

- <KursNr> (run number)

- <LinienfahrwegID> (line route ID)
- <ProduktID> (product ID
- <BetreiberID> (operator ID)
- <Betreiber>

All other elements are not supported.

CUS as rail data producer – DPB (client)

All sub-elements of the element <FahrtInfo> are not supported and transmitted values may be ignored. These values are not passed on to third parties; this also applies to the data platform function.

6.2.3.3.2. Information on direct communication (*Direktruf*)

(see VDV Guideline 453)

6.2.4. Process data service (ANS)

(see VDV Guideline 453)

CUS as data platform – DDS (client)

For technical reasons, there is currently no automatic connection protection from partner services to SBB trains.

6.2.4.1. Data sharing

(see VDV Guideline 453)

6.2.4.1.1. Updating / hysteresis

(see VDV Guideline 453)

For application in the Swiss public transport system, a standard value of 30 seconds has been defined for the hysteresis for all systems. If a subscription contains a different value, the servers are nevertheless entitled to process the subscription with a delay of 30 seconds.

6.2.4.1.2. Vorschauzeit (preview time)

(see VDV Guideline 453)

6.2.4.2. Subscribe to connection data (*AboASB*)

Deviations from and clarifications to the VDV Guideline 453 are:

Element	Comments	Field
ASBID	AnschlussbereichsID (connection area ID) (e.g. S8506016 for operating point Oberwinterthur) See Section 6.1.4	mandatory
Fahrtfilter (Journey filter)	see VDV Guideline 453	optional CUS: n/a
Zeitfilter (Time filter)	See VDV Guideline 453 and Section 6.2.4.2.2	optional
Hysterese (hysteresis)	Fixed at 30 seconds	mandatory
AbbringerInfo (feeder info)	see VDV Guideline 453	optional CUS: n/a

Table 21: Structure of AboAnfrage (subscription query) **with** <AboASB>

6.2.4.2.1. Journey-related data (*Fahrtfilter, or journey filter*)
(see VDV Guideline 453)

CUS comment:
Not supported by CUS.

6.2.4.2.2. Time-related data (*Zeitfilter, or time filter)*
(see VDV Guideline 453)

Deviations from and clarifications to the VDV Guideline 453 are:

Element	Comments	Field
LinienID (line ID)	If the LinienID (line ID) is omitted, all lines are subscribed to from this operating point. See also Section 6.1.6	optional
Vorschauzeit (preview time)	Time in minutes before the planned arrival time of the feeder at which feeder forecasts may be sent. CUS comment: Default: 30 minutes (via Property), if not set by the partner. See also Section 6.2.4.2.4.	optional

Table 22: Structure of <ZeitFilter>

Recommendation: The <SpaetesteAnkunftszeit> (latest arrival time) element should occur after the subscription time up to max. 24 hours in the future. The value for the <Frueheste-Ankunftszeit> (earliest arrival time) element can be any value in the past.

Formula: <SpaetesteAnkunftszeit> - subscription time =< 24

Example:
In the following example, feeder data of the trips on line 2, direction "railway station", are subscribed for a trip approaching a connection area (ITCS A). Data is only sent for vehicles that reach the connection area between 15:50 and 16:10 according to the current forecast.

```
<AboAnfrage Sender=ITCSa_prod Zst=2014-04-08T15:45:00>
      <AboASB AboID=25 VerfallZst=2014-04-08T16:10:00>
            <ASBID>S8506016</ASBID>
            <ZeitFilter>
                  <LinienID>S12</LinienID>
                  <RichtungsID>W-OWT</RichtungsID>
                  <FruehesteAnkunftszeit>
                        2014-04-08T15:50:00
                  </FruehesteAnkuntszeit>
                  <SpaetesteAnkunftszeit>
                        2014-04-08T16:10:00
                  </SpaetesteAnkuntszeit>
            </ZeitFilter>
            <Hysterese>30</Hysterese>
```

```
      </AboASB>
</AboAnfrage>
```

CUS comment:

Although the <ZeitFilter> (time filter) element is marked as optional in the XSD, it must always be specified in CUS, as the <FahrtFilter>(journey filter) element is not supported. If the <ZeitFilter> is missing, the corresponding subscription is discarded and an error is returned.

CUS as data platform – DDS (server)

If a subscription is received where the <SpaetesteAnkunftszeit> (latest arrival time) is more than 24h in the future, the subscription is rejected, an error message is generated and sent to the partner and an appropriate log entry is written.

The value in the element <FruehesteAnkunftszeit> may be any time in the past, but CUS internally shortens the time into the past to a configurable value. This value is currently one hour.

6.2.4.2.3. Additional information on the feeder (*AbbringerInfo*)

(see VDV Guideline 453)

Deviations from and clarifications to the VDV Guideline 453 are:

Element	Comments	Field
FahrtInfo (journey info)	see VDV Guideline 453 see also Section 6.2.3.3.1	**mandatory**
AbfahrtssteigText (departure bay text)	see VDV Guideline 453 see also Section 6.1.14.1	optional
HaltepositionsText (stop position text)	Customer-relevant boarding area (track) of a vehicle, see also Section 6.1.14.1	optional
AbfahrtsSektoren (departure sectors text)	see VDV Guideline 453 see also Section 6.1.14.1	optional

Table 23: Structure of <AbbringerInfo>

CUS comment:

The <AbbringerInfo> (feeder info) is not supported by CUS.

6.2.4.2.4. Implicit preview time with ANS (Addition in VDV-RV 453)

(Because the following text is only relevant for direct connection to CUS, it may potentially be hidden. The documentation in its entirety is available only in the CUS version)

CUS comment:

CUS does not currently support the preview time element in the time filter. Instead, an implicit preview time (currently 30 minutes), configurable in the master data, is specified[6]. The first message is sent to a vehicle (which meets the filter criteria) only when it reaches this preview time.

[6] Due to the technology employed, the actual timing of the first message may be delayed by up to 5 minutes.

Example:

Setting up the subscription: `04:10:00`

Earliest arrival time (FrühesteAnkunftszeit): **`15:50:00`**

Latest arrival time (SpätesteAnkunftszeit): **`16:10:00`**

Arrival time AZB plan train 1 (AnkunftszeitAZBPlan Zug1): **`15:55`** `->` 1. Message to train 1 is sent at **`15:25h`** .

Arrival time AZB plan train 2 (AnkunftszeitAZBPlan Zug2): **`16:10`** `->` 1. Message to train 2 is sent at **`15:40h`**.

6.2.4.3. Message to feeder (*Zubringernachricht*)

(see VDV Guideline 453)

Element	Comments	Field
AboID (subscription ID)	(attribute) see VDV Guideline 453	mandatory
ASBFahrplan (ASB timetable)	Is not supported.	optional CUS: n/a
ASBFahrplanlage (ASB timetable status)	see VDV Guideline 453	optional
ASBFahrtLoeschen (delete ASB journey)	see VDV Guideline 453	optional

Table 24: Structure of `<Zubringernachricht>` (feeder message)

6.2.4.3.1. Transmit connection data (*ASBFahrplanlage*)

(see VDV Guideline 453)

The stipulations of VDV Guideline 453 generally apply to the sending of `<ASBFahrplanlage>` elements.

Deviations from and clarifications to the VDV Guideline 453 are:

Element	Comments	Field
Protokolleintrag (Log entry)	see VDV Guideline 453 CUS as rail data producer – DPB (client): Log entries for rail traffic are not channelled through the CUS core; they are lost. CUS as rail data producer – DPB (server): CUS does not post any log entries at the `<ASBFahrplanlage>` level.	optional
ASBID	AnschlussbereichsID (connection area ID) (e.g. S8506016 for operating point Oberwinterthur) See Section 6.1.4	mandatory
FahrtID (journey ID)	See Section 6.1.5	mandatory

Element	Comments	Field
HstSeqZaehler (Stop sequence counter)	Strictly in ascending order - (see Section 6.1.8)	mandatory
LinienID (line ID)	Metadata, exclusively used for subscription. See Section 6.1.6	mandatory
LinienText (line text)	Customer-relevant line name or train category, displayed as line name for a vehicle. See also Section 6.1.6.	mandatory
RichtungsID (direction ID)	Metadata, exclusively used for subscription. See Section 6.1.6	mandatory
RichtungsText (direction text)	Customer-relevant destination. See Section 6.1.6.	mandatory
VonRichtungsText (from direction text)	Customer-relevant origin of vehicle. See Section 6.1.6	optional
AufASB	Arrival information (default = "false"). See also Section 6.1.15	optional
Umsteigewillige	see VDV Guideline 453	optional CUS DPB: n/a
ZubringerHstLang	see VDV Guideline 453	optional CUS DPB: n/a
SpaetesteAbbringerInfo (latest feeder info)	see VDV Guideline 453	optional CUS DPB: n/a
HaltID (stop ID)	Technical ID for a stop 7 stopping position (track). See also Section 6.1.14.4	mandatory

Element	Comments	Field
AnkunftssteigText (arrival bay text)	(please refer to VDV Guideline 454 and Section 6.1.14.2) Details of boarding area (e.g. platform) without sector. Does not apply to the starting point, but see also Section 6.1.14.1 CUS comment: **N.B:** In all VDV 453 and 454 services from version XSD2017 on, track and sector information are obtained from the data platform and also supplied to CUS in two separate fields. CUS as rail data producer – DPB (client): • Inbound is not processed, i.e. is not channelled through the CUS core. • The local traffic platforms in the core are handled in the same way as rail traffic, i.e. they are not processed. CUS as rail data producer – DPB (server): The core is populated with the information on the actual or scheduled arrival track. Examples of how the bays and sectors are populated: • `<AnkunftssteigText>6</AnkunftssteigText>` • `<AnkunftsSektorenText>AB</AnkunftsSektorenText>` CUS as data platform – DDS: • If the stop position text is entered in an XSD2017 message, this value is acquired for the conversion to XSD2015. In this case, the `<AnkunftssteigText>` (arrival bay text) is not acknowledged and is lost. • If the `<HaltepositionsText>` (stop position text) is not present in an XSD2017 message, the `<AnkunftssteigText>` (arrival bay text) is converted into the `<HaltepositionsText>` (stop position text) field during conversion to XSD2015. • When converting from XSD2015 to XSD2017, only the stop position text is retrieved, i.e. the arrival bay text is not populated.	optional / Rail: mandatory, exceptions are possible by mutual agreement
HaltepositionsText (stop position text)	Customer-relevant vehicle stop (track). See also Section 6.1.14.1 CUS comment: See also `<AnkunftssteigText>` above, especially for what happens when converting between XSD2015 and XSD2017.	optional

Element	Comments	Field
AnkunftsSektorenText (arrival sector text)	see VDV Guideline 453 see also Section 6.1.14.1 Does not apply to the starting point. CUS comment: See <AbfahrtssteigText> above for an example of how CUS populates bays and sectors. CUS as rail data producer – DPB (client): Inbound is not processed, i.e. is not channelled through the CUS core. CUS as rail data producer – DPB (server) : The core is populated with the information on the actual or scheduled arrival sector. CUS as data platform – DDS: • When converting from XSD2015 to XSD2017, the <AnkunftsSektorenText> (arrival sectors text) is not populated. • When converting from XSD2015 to XSD2017, the <AnkunftsSektorenText> (arrival sectors text) is not retrieved and is lost.	optional
Stauindikator (congestion indicator)	see VDV Guideline 453	optional CUS DPB: n/a
FahrtInfo (journey info)	see VDV Guideline 453 See also Section 6.2.3.3.1	**mandatory**

Table 25: Structure of <ASBFahrplanlage> (ABS timetable status)

6.2.4.3.2. Feeder cancellation (*ASBFahrtLoeschen*)

(see VDV Guideline 453)

The reasons why a journey might be cancelled are stated in [1]. Otherwise, the same restrictions and special considerations as for transmitting the <ASBFahrplanlage> apply in principle.

Deviations from and clarifications to the VDV Guideline 453 are:

Element	Comments	Field
Protokolleintrag (log entry)	see VDV Guideline 453 CUS comment: CUS as rail data producer – DPB (client): Log entries for rail traffic are not channelled through the CUS core; they are lost. CUS as rail data producer – DPB (server): CUS does not post any log entries at the <ASBFahrtLoeschen> (feeder cancellation) level.	optional

Element	Comments	Field
ASBID	AnschlussbereichsID (connection area ID) (e.g. S8506016 for operating point Oberwinterthur) See Section 6.1.4	manda-tory
FahrtID (journey ID)	See Section 6.1.5	manda-tory
LinienID (line ID)	See Section 6.1.6	manda-tory
LinienText (line text)	Customer-relevant line name or train category, displayed as line name for a vehicle. See also Section 6.1.6	manda-tory
RichtungsID (direction ID)	See Section 6.1.6	manda-tory
RichtungsText (direc-tion text)	Customer-relevant destination. See Section 6.1.6	manda-tory
VonRichtungsText (from direction text	Passenger-relevant origin text	optional CUS DPB: n/a
AnkunftszeitASBPlan (arrival time ASB plan)	see VDV Guideline 453 CUS comment: CUS as rail data producer – DPB (client): Inbound is not processed, i.e. is not channelled through the CUS core. CUS as rail data producer – DPB (server): The field is populated outbound the same way as for the <ASBFahrplanlage> (ASB timetable status), i.e. with the arrival time in the timetable (see section 6.2.4.3.1). CUS as data platform – DDS: • Is not recognised inbound for DDS local traffic XSD2017. Even if all the fields in an <ASBFahrtLoeschen> message are populated, an <ASBFahrplanlage> is still required as the first message. • Is also not recognised inbound for DDS local traffic XSD2017 in the core. No planning times are changed on the basis of an <ASBFahrtLoeschen> message (analogous to the previous point and rail traffic above). • When converting from XSD2015 to XSD2017, the <AnkunftszeitASBPlan> (arrival time ASB plan) is populated with the scheduled time from the most recently populated <ASBFahrplanlage> (ASB timetable status). • When converting from XSD2017 to XSD2015, the planning times cannot be retrieved and are lost. Altered planning times are therefore also not converted from CUS to XSD2015.	optional

Element	Comments	Field
HaltID (stop ID)	Technical ID for a stop (track). See also Section 6.1.14.4 CUS comment: CUS as rail data producer – DPB (client): Inbound is not processed, i.e. is not channelled through the CUS core. CUS as rail data producer – DPB (server): The field is populated outbound the same way as for the <ASBFahrplanlage> (ASB timetable status), i.e. with the BpUic of the boarding area (see Section 6.2.4.3.1). CUS as data platform – DDS: • When converting from XSD2015 to XSD2017, the <HaltID> (stop ID) is not populated. • When converting from XSD2015 to XSD2017, the <HaltID> cannot be retrieved and is lost.	optional
HaltepositionsText (stop position text)	Customer-relevant vehicle stop (track). See also Section 6.1.14.1 CUS comment: CUS as rail data producer – DPB (client): Inbound is not processed, i.e. is not channelled through the CUS core. CUS as rail data producer – DPB (server): The field is populated outbound the same way as for the <ASBFahrplanlage> (ASB timetable status), i.e. with the rack and sectors (see Section 6.2.4.3.1). CUS as data platform – DDS: • When converting from XSD2015 to XSD2017, the <HaltepositionsText> is populated with the relevant value from the most recently supplied <ASBFahrplanlage>. • When converting from XSD2015 to XSD2017, the <HaltepositionsText> cannot be retrieved and is lost.	optional

Element	Comments	Field
FahrtInfo (journey info)	see VDV Guideline 453 See also Section 6.2.3.3.1 CUS comment: CUS as rail data producer – DPB (client): Inbound is not processed, i.e. is not channelled through the CUS core. CUS as rail data producer – DPB (server): Outbound, the field is populated in the same way as the <ASBFahrplanlage> (see Section 6.2.4.3.1). CUS as data platform – DDS: • When converting from XSD2015 to XSD2017, the <FahrtInfo> is populated with the relevant values from the most recently supplied <ASBFahrplanlage>. • When converting from XSD2015 to XSD2017, the <FahrtInfo> cannot be retrieved and is lost.	**mandatory**
Ursache (cause)	see VDV Guideline 453 Note: The cause may only be stated in the event of a cancellation.	conditionally optional

Table 26: Structure of <ASBFahrtLoeschen> (delete ASB journey)

6.2.4.4. Connector messages (Abbringernachricht)
(see VDV Guideline 453)

CUS DPB comment:
The return channel <Abbringernachricht> according to VDV Guideline 453 is not supported. However, scheduling decisions by the partner can be transmitted via the field <AbfahrtszeitAZBDisposition> (departure time AXBD scheduling) field in the DFI service[7].

6.3. Dynamic passenger information (REF-DFI, DFI)

6.3.1. Introduction
(see VDV Guideline 453)

6.3.2. Operational data supply and maintenance
(see Section 2.1.2 and VDV Guideline 453)

6.3.3. DFI systems with key control
(see VDV Guideline 453)

CUS comment:
Is not supported by the CUS.

[7] This will automatically initiate an update of the forecast time for the vehicle concerned.

6.3.4. DFI systems with autonomous prediction display

(see VDV Guideline 453)

CUS comment:

Is not supported by the CUS.

6.3.5. Sharp deletion

(see VDV Guideline 453)

CUS comment:

Is not supported by the CUS.

6.3.6. Tractions / through carriages / dividing journeys

(see VDV Guideline 453)

CUS comment:

Is not supported by the CUS.

6.3.7. Reference data service (REF-DFI)

(see VDV Guideline 453)

6.3.8. Process data service (DFI)

(see VDV Guideline 453)

CUS comment:

Is not supported by the CUS.

6.3.8.1. Data sharing

(see VDV Guideline 453)

6.3.8.1.1. Preview time (Addition in VDV-RV 453)

(Because the following text is only relevant for direct connection to CUS, it may potentially be hidden. The documentation in its entirety is available only in the CUS version)

CUS comment:

CUS as data platform – DDS (server)

The first message from CUS takes place when the `<Vorschauzeit>` (preview time) is reached. CUS accepts a minimum of 10 minutes and a maximum of 180 minutes as the `<Vorschauzeit>` for the subscriptions provided. Times of less than 10 minutes and greater than 180 minutes are rounded to the nearest margin value [10, 180].

CUS as data platform – DDS (client)

CUS provides subscriptions with a `<Vorschauzeit>` of 10 to 180 minutes (default = 30 minutes).

6.3.8.2. Querying DFI data (*AboAZB*)

(see VDV Guideline 453)

Deviations from and clarifications to the VDV Guideline 453 are:

Element	Comments	Field
AZBID	AnzeigerbereichsID (display area ID) (e.g. Z8506016 for operating point Oberwinterthur) See Section 6.1.4	manda-tory
LinienID (line ID)	If the <LinienID> (line ID) is omitted, all lines are subscribed to from this operating point. See also Section 6.1.6.	optional
RichtungsID (direction ID)	If the <RichtungsID> is omitted, all directions are subscribed to from this operating point. See also section 6.1.6.4.	optional
MaxAnzahlFahrten (max. no. journeys)	See VDV Guideline 453	optional CUS DPB: n/a
Hysterese (Hystere-sis)	Fixed at 30 seconds. CUS comment: (if an anomalous value is sent, this is replaced internally)	manda-tory
MaxTextLaenge (max. text length)	See VDV Guideline 453	optional CUS DPB: n/a
NurAktualisierung (update only)	See VDV Guideline 453 CUS comment: Is implemented inbound and outbound. If an inbound partner has not implemented <NurAktualisierung>, then they simply deliver all the data again. The subscription requests (<AboAnfragen>) are sent out with the changed operating day: • If the subscription definition has not changed from the previous day, the flag <NurAktualisierung=true> is sent in the subscription request. • If, on the other hand, there is a technical change to the subscription definition, the subscription is deleted and a new subscription request sent.	optional

Table 27: Structure of AboAnfrage (subscription query) with <AboAZB> (display user subscription)

6.3.8.3. Display user messages (AZBNachricht) (*AZBNachricht*)
(see VDV Guideline 453)

Deviations from and clarifications to the VDV Guideline 453 are:

Element	Comments	Field
AboID (subscription ID)	(attribute) see VDV Guideline 453	mandatory
AZBFahrplan (display user timetable)	see VDV Guideline 453	optional CUS: n/a
AZBFahrplanlage (display user timetable status)	see VDV Guideline 453	optional
AZBFahrtLoeschen (delete display user journey)	see VDV Guideline 453	optional
AZBLinienSpezialtext (display user line special text)	see VDV Guideline 453	optional CUS: n/a
AZBLinienSpezialtext-Loeschen (delete display user line special text)	see VDV Guideline 453	optional CUS: n/a
AZBSondertext (display user special text)	(sub-element, optional, multiple) Transmission of free special texts without any technical reference (although may contain a text reference) to a journey or line (shown, for example, as a ticker in the lower portion of the display).	n/a
AZBSondertext-Loeschen (delete display user special text)	(sub-element, optional, multiple) Delete special text information	n/a

Table 28: Structure `<AZBNachricht>` (display user message)

6.3.8.3.1. Transmit forecast data (*AZBFahrplanlage) (display user timetable status)*
(see VDV Guideline 453)

Deviations from and clarifications to the VDV Guideline 453 are:

Element	Comments	Field
Protokolleintrag (log entry)	See VDV Guideline 453 CUS comment: CUS as rail data producer – DPB (client): Log entries for rail traffic are not channelled through the CUS core; they are lost. CUS as rail data producer – DPB (server): CUS does not post any log entries at the level. `<AZBFahrplanlage>`	optional
AZBID	AnzeigerbereichsID (display area ID) (e.g. Z8506016 for operating point Oberwinterthur) See Section 6.1.4	mandatory
FahrtID (journey ID)	See Section 6.1.5.	mandatory

Element	Comments	Field
HstSeqZaehler (Stop sequence counter)	Strictly in ascending order - (see Section 6.1.8). CUS as rail data producer – DBP (client): The element is not evaluated.	manda-tory
Traktion (Traction)	See VDV Guideline 453	optional CUS DPB: n/a
Betriebliche Fahrzeugnummer (Operational vehicle number)	See VDV Guideline 453	optional CUS DPB: n/a
LinienID (line Id)	Metadata, exclusively used for subscription. See Section 6.1.6 CUS as rail data producer – DBP (client): The element is not evaluated.	manda-tory
LinienText (line text)	Customer-relevant line name or train category, displayed as line name for a vehicle. See also Section 6.1.6. CUS as rail data producer – DBP (client): The element is not evaluated.	manda-tory
FahrtBezeichnerText (journey description text)	See VDV Guideline 453 The Zugnummer (train number) is transmitted in this element in the Swiss public transport system. When converting from XSD2015 to XSD2017, the <FahrtBezeichnerText> is transmitted with the journey/vehicle/train number.	op-tional/manda-tory
RichtungsID (direction ID)	Metadata – not for customer display. See Section 6.1.6. CUS as rail data producer – DBP (client): The element is not evaluated.	manda-tory
RichtungsText (direc-tion text)	Customer-relevant destination. See Section 6.1.6. CUS as rail data producer – DBP (client): The element is not evaluated.	manda-tory
VonRichtungsText (from direction text)	VonRichtungsText Customer-relevant origin of vehicle. See also Section 6.1.6. CUS as rail data producer – DBP (client): The element is not evaluated.	optional
AbmeldeID (log off ID)	See VDV Guideline 453	optional CUS DPB: n/a
ZielHst	Operational destination as operational abbreviation as per DiDok (e.g. ZUE for Zürich HB, BN for Bern, LS for Lausanne, etc.).	manda-tory
AufAZB	Arrival information. See also Section 6.1.15.	optional

Element	Comments	Field
ViaHst1Lang	See Section 6.1.6.5 and VDV Guideline 453 CUS comment: Via information, incl. prioritisation of operating points (see Section 6.1.6.5) CUS as rail data producer – DBP (client): The element is not evaluated. (see Section 6.1.6.5).	optional
ViaHst2Lang	See Section 6.1.6.5 and VDV Guideline 453	optional CUS DPB: n/a
ViaHst3Lang	See Section 6.1.6.5 and VDV Guideline 453	optional CUS DPB: n/a
Via	See Section 6.1.6.5 and VDV Guideline 453 The Via element must always include the same information as Hst1Lang to ViaHst3Lang. When converting from XSD2015 to XSD2017, the information must be transferred to the Via element from ViaHst1Lang, as long as these are formatted 6.1.6.5 by chapter. CUS comment: CUS as rail data producer – DPB (client): • Via for rail traffic is not channelled through the CUS core; they are lost. • Local traffic inbound to the core: If the 'Via' structure of the <AZBFahrplanlage> (timetable status) contains data, it is evaluated and acquired in the core. If this list is empty, the core then uses the field <ViaHst1Lang> as in v2015a. CUS as data platform – DDS: • When converting from XSD2015 to XSD2017, the 'Via' field is retrieved and forwarded. • When converting from v2017c to v2015a, only the field <ViaHst1Lang> is retrieved, i.e. the 'Via' structure data is lost.	optional
FahrtStatus (journey status)	See VDV Guideline 453	mandatory
AnkunftszeitAZBPlan, AbfahrtszeitAZBPlan (arrival time display user plan, departure time display user plan)	Planning times, see [1] Section 6.3.8.3.1. CUS as rail data producer – DBP (client): The elements are not evaluated.	optional
AnkunftszeitAZBPrognose, AbfahrtszeitAZBPrognose	See [1] Section 6.3.8.3.1 Times forecast based on the current position of the vehicle. (no allowance for deployment)	optional
AnkunftFaelltAus (arrival cancelled)	See VDV Guideline 453 CUS as rail data producer – DBP (client): The element is not evaluated.	optional

Element	Comments	Field
AbfahrtFaelltAus (departure cancelled)	See VDV Guideline 453 CUS as rail data producer – DBP (client): This is dealt with in the same way as an <AZBFahrtLoeschen> with a non-zero cause, i.e. it is evaluated as a partial cancelation until the next stop.	optional
AbfahrtszeitAZBDisposition (display user departure time deployment)	For transmitting the timing effects of a deployment decision. As soon as the deployment is lifted, the element is no longer set.	optional
Fahrtspezialtext (journey special text)	See VDV Guideline 453 CUS as rail data producer – DPB (client/server) This element is not supported.	optional CUS DPB: n/a
Sprachausgabe (Language version)	See VDV Guideline 453 CUS as rail data producer – DPB (client/server) This element is not supported.	optional CUS DPB: n/a
HaltID (stop ID)	Technical ID for a boarding area (track). See Section 6.1.14.4.	mandatory
AnkunftssteigText (arrival bay text)	See VDV Guideline 453 and Section 6.1.14.1 Details of boarding area (e.g. platform) without sector. Does not apply to the starting point. CUS comment: Corresponding to the <AbfahrtssteigText> below.	Optional/rail: mandatory, exceptions are possible by mutual agreement

Element	Comments	Field
AbfahrtssteigText (departure bay text)	as in VDV Guideline 453 see also Section 6.1.14.1 Details of boarding area (e.g. platform) without sector. Does not apply to starting point. CUS comment: **N.B:** In all VDV 453 and 454 services from XSD2017 on, track and sector information are obtained from the data platform and also supplied to CUS in two separate fields. CUS as rail data producer – DPB (client): • Inbound, the <AbfahrtssteigText> is required for the tracks. If the <AbfahrtssteigText> is not supplied, CUS determines the tracks from the stop position text (<HaltepositionsText>) (see below). • The local traffic platforms in the core are handled in the same way as rail traffic. CUS as rail data producer – DPB (server): Outbound, the CUS core populates the arrival and departure bay texts as well as the stop position text. Examples of how the bays and sectors are populated: • <AbfahrtssteigText>6</AbfahrtssteigText> • <AbfahrtsSektorenText>AB</AbfahrtsSektorenText> CUS as data platform – DDS: • If the stop position text is entered in an XSD2017 message, this value is acquired for the conversion to XSD2015. In this event, the arrival and departure bay texts are not acknowledged and are lost. • If the <HaltepositionsText> (stop position text) is not present in an XSD2017 message, either the <AnkunftssteigText> (arrival bay text) or the <AbfahrtssteigText> (departure bay text) is transmitted in the <HaltepositionsText> (stop position text) field during conversion to XSD2015. • When converting from XSD2015 to XSD2017, only the stop position text is retrieved, i.e. the arrival/departure bay texts are not populated.	Optional/rail: mandatory, exceptions are possible by mutual agreement
HaltepositionsText (stop position text)	Customer-relevant vehicle boarding area. See also Section 6.1.14.1 CUS comment: See also <AbfahrtssteigText> above, especially for what happens when converting between XSD2015 and XSD2017.	optional
AnkunftsSektorenText (arrival sector text)	see VDV Guideline 453 see also Section 6.1.14.1 Does not apply to the starting point. See AbfahrtsSektorenText below.	optional

Element	Comments	Field
AbfahrtsSektoren (departure sectors text)	see VDV Guideline 453 see also Section 6.1.14.1 Does not apply to the end stop. See <AbfahrtssteigText> above for an example of how CUS populates bays and sectors. CUS comment: CUS as rail data producer – DPB (client): Inbound, the <AbfahrtssteigText> is required for the sectors. If the <AbfahrtsSektorenText> is not supplied, CUS determines the sectors from the stop position text (<HaltepositionsText>) (see below). CUS as rail data producer – DPB (server): Outbound, the CUS core populates the arrival and departure bay texts as well as the stop position text. CUS as data platform – DDS: Conversion between XSD2015 and XSD2017 does not take place for local traffic.	optional
FahrtInfo (journey info)	see VDV Guideline 453 See also Section 6.2.3.3.1	**mandatory**
Einsteigeverbot (no boarding)	see VDV Guideline 453	optional
Aussteigeverbot (no alighting requirements)	see VDV Guideline 453 See also Section 6.1.14.8	optional
Durchfahrt (non-stopping pass)	see VDV Guideline 453 See also Section 6.1.14.6 CUS as rail data producer – DPB: true with unusual non-stopping pass Otherwise, non-stopping passes are not transmitted (same behaviour as with REF-AUS).	optional

Table 29: Structure of the <AZBFahrplanlage> (display user timetable status)

Implementation information:

Instead of <AZBFahrplanlage> with:

- <AnkunftFaelltAus = true>
- <AbfahrtFaellAus = true>
- With <AnkunftszeitAZBPlan>
- With <AbfahrtszeitAZBPlan>

Is recommended to send an <AZBFahrtLoeschen> (delete display user journey) with cause = cancellation. This implementation information on the use of <AnkunftFaelltAus> (arrival cancelled) and <AbfahrtFaellAus> (departure cancelled) was added in VDV 453 version 3.

The new elements <AnkunftFaelltAus> and <AbfahrtFaelltAus> must be received, evaluated and forwarded. If both elements are set as true, (and both must be true even at a start or end stop), a <AZBFahrtLoeschen> element should be triggered with <Ursache=Ausfall> (cause=cancellation) when converting to an older XSD version. It is not possible to generate the elements <AnkunftFaelltAus> and <AbfahrtFaelltAus> when converting from an older XSD version, they are not set.

Explanation for <AbfahrtszeitAZBDisposition> (departure time display user deployment)

cf. VDV Guideline 453, Section 6.3.8.3.1 Transmitting forecasting (*AZBFahrplanlage*) [1]

Attribute	Meaning
<AbfahrtszeitAZBDisposition> not available	1.) No planning deployment takes place. **or** 2.) A deployment measure that was sent previously has been reset.
<AbfahrtszeitAZBDisposition> populated with specific value	planning measures that purposely delay the journey

Table **30**: Explanation for **<AbfahrtszeitAZBDisposition>**

6.3.8.3.2. Traction in network (*Traktion*)
(see VDV Guideline 453)

CUS comment:
Is not supported by the CUS.

6.3.8.3.3. Transmitting special line texts (*AZBLinienSpezialtext*)
(see VDV Guideline 453)

CUS comment:
Is not supported by the CUS.

6.3.8.3.4. Deleting special line texts (*AZBLinienSpezialtextLoeschen*)
(see VDV Guideline 453)

CUS comment:
Is not supported by the CUS.

6.3.8.3.5. Transmitting special texts (AZBSondertext)
(see VDV Guideline 453)

In the Swiss public transport system, <AZBSondertext> does not need to be sent, evaluated or forwarded. If an <AZBSondertext> is received, an XSD validation error must never be triggered.

6.3.8.3.6. Deleting special texts (AZBSondertextLoeschen)
(see VDV Guideline 453)

In the Swiss public transport system, <AZBSondertextLoeschen> does not need to be sent, evaluated or forwarded. If an <AZBSondertextLoeschen> is received, an XSD validation error must never be triggered.

6.3.8.3.7. Journey cancellation/departure (AZBFahrtLoeschen)

(see VDV Guideline 453)

<AZBFahrtLoeschen> is used in VDV Guideline 453 to delete a journey from the display if it leaves the display area (operating point) or is cancelled at this operating point (full or partial cancellation of a journey).

Deviations from and clarifications to the VDV Guideline 453 are:

Element	Comments	Field
Protokolleintrag (log entry)	see VDV Guideline 453 CUS as rail data producer – DPB (client): Log entries for rail traffic are not channelled through the CUS core; they are lost. CUS as rail data producer – DPB (server): CUS does not post any log entries at the <AZBFahrtLoeschen> level.	optional
AZBID	AnzeigerbereichsID (display area ID) (e.g. Z8506016 for operating point Oberwinterthur) See Section 6.1.4	mandatory
FahrtID (journey ID)	See Section 6.1.5.	mandatory
LinienID (line ID)	Metadata, exclusively used for subscription. See Section 6.1.6	mandatory
LinienText (line text)	Customer-relevant line name or train category, displayed as line name for a vehicle. See also Section 6.1.6.	mandatory
RichtungsID (direction ID)	Metadata – not for customer display. See Section 6.1.6	mandatory
RichtungsText (direction text)	Customer-relevant destination. See Section 6.1.6	mandatory
VonRichtungsText (from direction text)	(optional) passenger-relevant journey origin text.	optional CUS DPB: n/a

Element	Comments	Field
AnkunftszeitAZBPlan (arrival time display user plan)	see VDV Guideline 453 CUS comment: CUS as rail data producer – DPB (client): Inbound is not processed, i.e. is not channelled through the CUS core, as no rail traffic planning times are adjusted on the basis of DFI messages (see also Section 6.3.8.3.1). CUS as rail data producer – DPB (server): Outbound, the field is populated in the same way as the <AZBFahrplanlage>, i.e. with the arrival time in the timetable (see Section 6.3.8.3.1). CUS as data platform – DDS: • Is not recognised inbound for DDS local traffic XSD2017. Even if all the fields in an <AZBFahrtLoeschen> message are populated, an <AZBFahrplanlage> is still required as the first message. • Is not recognised inbound for DDS local traffic XSD2017. Even if all the fields in an <AZBFahrtLoeschen> message are populated, an <AZBFahrplanlage> is still required as the first message. • Is also not recognised inbound for DDS local traffic XSD2017 in the core. No planning times are changed on the basis an <AZBFahrtLoeschen> message (analogous to the previous point and rail traffic above). • When converting from XSD2015 to XSD2017, the <AnkunftszeitAZBPlan> (arrival time display user plan) is populated with the scheduled time from the most recently populated <AZBFahrplanlage> (display user timetable status). • When converting from XSD2017 to XSD2015, the planning times cannot be retrieved and are lost. Altered scheduled times are therefore also not converted from CUS to XSD2015.	optional
AbfahrtszeitAZBPlan	See AnkunftszeitAZBPlan above.	optional

Element	Comments	Field
HaltID (stop ID)	see VDV Guideline 453 CUS comment: CUS as rail data producer – DPB (client): Inbound is not processed, i.e. is not channelled through the CUS core. CUS as rail data producer – DPB (server): Outbound, the field is populated in the same way as the <AZBFahrplanlage>, i.e. with the BpUic of the boarding area (see Section 6.3.8.3.1). CUS as data platform – DDS: • When converting from XSD2015 to XSD2017, the <HaltID> is populated with the relevant value from the most recently supplied <AZBFahrplanlage>. • When converting from XSD2015 to XSD2017, the <HaltID> cannot be retrieved and is lost.	optional
HaltepositionsText (stop position text)	Customer-relevant boarding area (track) or a vehicle. See also 6.1.14.1 CUS comment: CUS as rail data producer – DPB: • Inbound is not processed, i.e. is not channelled through the CUS core. • Outbound, the field is populated in the same way as the <AZBFahrplanlage>, i.e. with the track and sectors (see Section 6.3.8.3.1). CUS as data platform – DDS: • When converting from XSD2015 to XSD2017, the <HaltepositionsText> is populated with the relevant value from the most recently supplied <AZBFahrplanlage>. • When converting from XSD2015 to XSD2017, the <HaltepositionsText> cannot be retrieved and is lost.	optional
FahrtInfo (journey info)	see VDV Guideline 453 See also Section 6.2.3.3.1 CUS comment: CUS as rail data producer – DPB: • Inbound is not processed, i.e. is not channelled through the CUS core. • Outbound, the field is populated in the same way as the <AZBFahrplanlage> (see Section 6.3.8.3.1). CUS as data platform – DDS: • When converting from XSD2015 to XSD2017, the <FahrtInfo> is populated with the relevant values from the most recently supplied <AZBFahrplanlage>. • When converting from XSD2015 to XSD2017, the <FahrtInfo> cannot be retrieved and is lost.	**manda-tory**

Element	Comments	Field
AbmeldeID (log off ID)	see VDV Guideline 453 CUS as rail data producer – DPB: Is not supported.	optional CUS DPB: n/a
Ursache (cause)	See description below the table. Note: The cause may only be stated in the event of a cancellation. CUS as rail data producer – DPB: Cause of a cancellation. Does not apply to normal departure. When a cancellation occurs, the text “Ausfall” is sent (details see below).	condi-tionally optional

Table 31: Structure of `<AZBFahrtLoeschen>`

CUS comment:

CUS as rail data producer – DPB:

To identify a cancellation as opposed to a regular departure, a distinction must be made between two cases:

- If the <Ursache> field is **stated**, it is always a **cancellation**.
- If the <Ursache> field is **not stated**, it is a **regular departure.**

When a vehicle is cancelled, the cause (Ursache) must always be stated. This is the only way to tell from the message that it is a cancellation and not a regular departure. What is actually contained as text in the field `<Ursache>` is not relevant here (from today's point of view), although it is useful to state the actual cause if it is known when the message is sent.

It should be noted that the DFI service always considers the **departures** of a vehicle. This is the case even when a cancellation is reported. This has implications, especially when a partial cancellation is reported at consecutive operating points.

A reported cancellation does not therefore refer to the arrival but always to the departure at a specific operating point. It is not possible to state with absolute certainty whether the arrival is also affected by the reported cancellation. It is possible to make assumptions by checking the preceding operating to see if there has been a cancellation there as well, but when dealing with diversions this method can on occasion lead to incorrect assumptions.

Processing within CUS:

- When a `<AZBFahrtLoeschen>` the vehicle is tagged as departed.
- If, after an `<AZBFahrtLoeschen>`, another timetable status is received for the same journey, the vehicle is re-published and the departure tag reset.
- In the event that partners handle train instructions and cancellations via SBB's NeTS or RCS, SBB will deactivate cancellation detection via the VDV message.

6.4. Visualisation of external vehicles (VIS)

(see VDV Guideline 453)

CUS comment:

Is not supported by the CUS.

6.5. General messaging service (AND)

(see VDV Guideline 453)

CUS comment:

Is not supported by the CUS.

7. Glossary

AND	General messaging service: VDV specification for the exchange of operational information between employees of the transport company control points involved.
ANS	Connection protection: VDV specification for data exchange between transport companies with the aim of mutual assurance of connections between feeding and connecting means of transport.
ASB	Connection area
AZB	Display area
BP	Operating point (train station, stop)
CUS	The Swiss public transport system's data platform, run by SBB
CUS core	Is basically the CUS data producer. Also, all rail data are loaded into the core. The CUS core offers additional services (e.g. computer interface, VDV453<-> VDV454 conversion, etc.) for other railways.
Data subscribers	This document refers to the following data subscribers: - Display system - Timetable information system - Data platform In some cases, data subscribers are restricted.
Data producers	The following systems are designated as data producers: - All systems that process data and send it to a data platform Data platforms do not produce any data!
DFI	Dynamic passenger information: VDV specification for data exchange between transport companies with the aim of displaying external journeys at their own shared stops.
DIDOK	Service point documentation: master system for managing the master data of all service points, the international union of railways (UIC) and the Swiss public transport system.
GO-Nr.	Business organisation number: DiDok [4]maintains a directory of business organisations. These can be the business organisations of transport companies (e.g. sub-organisations such as SBB-P, SBB-I, etc.) as well as other business organisations (such as Hotelplan Schweiz). The GO-Nr (GO no.) is the unique identifier of these business organisations. The DiDok conversion systems almost exclusively require the GO no. (synonym: TC code) and not the transport company number.
INFO+	Collection of Swiss public transport timetables
ITCS	Intermodal Transport Control System.
KTU / TU	(Licensed) transport companies.
NeTS	Network-wide train path system: national planning system for train paths and services.
Seasonal timetable	Timetable valid for a defined period of time and containing the (working) timetable data, normally for that particular season. It can be adjusted to suit changing circumstances. Example: INFO+. The complete period timetable is not available via VDV interfaces.
RBL	Computer-aided control system -> this term has been replaced by ITCS and is no longer used.
RCS	Rail Control System: used by SBB and some private railway companies. It is used to help carry out rail operations.

Working timetable data	Working timetable data includes all working timetable data (such as daily working timetable, period timetable)
Daily working timetable	The daily working timetable contains the (working) timetable data for a short amount of time (approx. 24 to 48 hrs.) This data is exchanged via the VDV454 REF-AUS data service.
VDV	Verband Deutscher Verkehrsunternehmen (German Association of Transport Companies)
VM	Vehicle; synonym for all means of transport relevant to customer information (e.g. train, bus, tram, boat, funicular, etc.)

8. References

(see VDV Guideline 453)

9. English alias designation

(see VDV Guideline 453)