XSD2017d

VDV-Implementation rules 454 – Swiss Public transport

Based on VDV Guideline 454 version 2.2.1

Author(s)	KIDS Working Group
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Version	V 1.6
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Contents

Change history from V 1.1 to 1.2

Section	Change	Changed by	Changed on
Sect. 1.4		KIDS WG	20.12.16
Sect. 3.2.6	Subscription behaviour for REF-AUS in Swiss public transport CR0024 from WG meeting on 15.09.2016	KIDS WG	04.10.16
Sect. 5.1.1	Implementation of operator filter for data platforms and ITCS with two or more operators is mandatory. The use of the operator filter by clients is recommended. CR0036 from WG meeting dated 15.09.2016	KIDS WG	04.10.16
Sect. 5.1.1, 5.2.1	Use of placeholders in the Swiss public transport system CR0039 from WG meeting dated 08.06.2016	KIDS WG	17.08.16
Sect. 5.2.2	In the Swiss public transport system, the first message in the AUS service must always be a complete journey, in order to ensure an initial status in each case for the journey, which is independent of the service. CR0030 from WG meeting dated 08.06.2016	KIDS WG	17.08.16
Sect. 5.1.3.1, 5.2.2.1	Order of stops as per inspection. CR0032 from WG meeting dated 08.06.2016	KIDS WG	17.08.16

Change history from V 1.2 to 1.3

Section	Change	Changed by	Changed on
1.4	Reference [6] added	C. Heimlicher	18.12.17

3.3	Sections ProduktID (product ID) VerkehrsmittelText (transport mode text) revised in accordance with harmonisation of transport. In particular, the transport category sources were replaced by transport categories and the table was added.	C. Heimlicher	18.12.17
5.1.3.1	The section now matches the VDV standard in version 2.5. Processing has not changed.	KIDS WG	17.07.17
5.2.2.1	The section now matches the VDV standard in version 2.5. Processing has not changed.	KIDS WG	17.07.17
5.2.2.8	New section included from VDV Guideline 454.	KIDS WG	17.07.17
6.1.10	Withdrawal of PrognoseMoeglich (forecast possible) from true to false was given new processing in VDV Guideline 454. This is not compatible with previous versions.	KIDS WG	17.07.17
6.1.15	New section included from VDV Guideline 454.	KIDS WG	17.07.17
6.1.6	The description of partial cancellations (route changes) was moved from section 6.1.12 to section 6.1.6. Implementation remains the same.	KIDS WG	04.10.17
6.1.12	For total cancellations, it was clarified that only the last valid stops (from the last complete journey) need to be transmitted again for a cancellation message. The fact that the FahrtStartEnde (journey start end) element is not permitted to be changed is already set out in the VDV Guideline.	KIDS WG	04.10.17
5.1.3 5.1.3.1	VerkehrsmittelText (transport mode text) and ProduktID (product ID) must be provided either in the line timetable or in the scheduled journey.	KIDS WG	06.12.17
5.2.2.1	VerkehrsmittelText (transport mode text) and ProduktID (product ID) must be provided in the actual journey.	KIDS WG	06.12.17

3.3	Text added for BetreiberID (operator ID): "An operator can deliver either rail or local transport data with a BetreiberID (operator ID). If an operator needs to deliver both rail and local transport data, this must be delivered with a different BetreiberID (operator ID) even if both use the same line.	KIDS WG	20.09.18
3.3	Text added for LinienID (line ID): "If an operator has multiple same lines (same line numbers), each of these lines must be delivered with a separate BetreiberID (operator ID)."	KIDS WG	20.09.18
5.2.1	In the Swiss public transport system, delivery of real-time information to the FOT and therefore in the CUS is mandatory for all transport companies.	KIDS WG	20.09.18
10.9	New values added for the VerkehrsmittelText (transport mode text) and the conversion procedure.	KIDS WG	20.09.18
10.10	New values added for the ProduktID (product ID) and the conversion procedure.	KIDS WG	20.09.18
10.11	New values added for the ServiceAttribut (service attribute) and the conversion procedure.	KIDS WG	20.09.18

Change history from V 1.3 to 1.4.2

Section	Change	Changed by	Changed on
Various	Offer category and transport category link to document created.	KIDS WG	26.11.2019
1.1	Reference to VDV Guideline 454, V2.2. Instruction repeated: version XSD2017.c must always be used across the Swiss public transport system.	KIDS WG	31.08.2020
1.4	An additional document created to clarify the use of the forecast status. This document has been linked in this section.	KIDS WG	13.07.2020
1.4	Links to the original documents added.	KIDS WG	26.11.2019
3.2.6 5.5.1	From XSD2017c, all subscriptions in the Swiss public transport system should be set with the element MitBereitsAktivenFahrten=true (with already active journeys = true) (default is "false"). The journeys must also be sent accordingly.	KIDS WG	13.07.2020

3.3	• Product ID (ProduktID) and transport mode text (VerkehrsmittelText) are mandatory in AUS and REF-AUS. Lists have been moved to an external document. • Specifics on VerkehrsmittelNummer (transport number) • Note on LinienText (line text) • Track and sector information is now delivered in or obtained from two separate fields in the CUS data platform. • Format of tracks and sectors for rail transport added. • A maximum of two values per line can be supplied with one character. The values "H" and "R" are recommended. These values must match the target data. The special case of rail is not applicable.	KIDS WG	06.07.2020
3.6	The time format is described in enough detail in the VDV Guideline and has therefore been deleted.	KIDS WG	26.11.2019
5.1.1	MitBereitsAktivenFahrten=true (with already active journeys = true) is now mandatory for subscriptions.	KIDS WG	31.08.2020
5.1.3	Transport mode text (VerkehrsmittelText) and product ID (ProduktID) are now mandatory	KIDS WG	31.08.2020
5.1.3.1	• Transport mode text (VerkehrsmittelText) and product ID (ProduktID) are now mandatory • Specifics on transport number (VerkehrsmittelNummer)	KIDS WG	31.08.2020
5.1.4	Section from VDV Guideline 454 added.	KIDS WG	31.08.2020
5.2.1	All suppliers must be able to work with the MitRealZeiten=true (with real time = true) flag in the subscription (see Section 1.4.3).	KIDS WG	27.11.2019
5.2.2	The text has been clarified and when changing PrognoseMoeglich (forecast possible) from "false" to "true" a complete journey must be sent with all stops.	KIDS WG	14.09.2020
5.2.2.1	• Transport mode text (VerkehrsmittelText) and product ID (ProduktID) are now mandatory • Specifics on VerkehrsmittelNummer (transport number)	KIDS WG	31.08.2020
5.2.2.3	More detail provided on handling forecast status in an external document.	KIDS WG	31.08.2020
5.2.2.8	Implementation note on Fahrtbeziehung (journey relationship) added:	KIDS WG	14.09.2020
5.3	Implementation note on AnschlussPlan (connection plan) added:	KIDS WG	14.09.2020
6.1.6	Comments added on transmitting route interruptions in rail transport.	KIDS WG	13.07.2020
6.1.9	Implementation note on new value PrognoseUngenau=unbekannt (forecast inaccurate = unknown) added.	KIDS WG	14.09.2020

6.1.12	For an initial message (as a complete journey), all stops must always be included in the Swiss public transport system, even in the case of a cancellation.	KIDS WG	27.11.2019
10.5	New values FehlendeRollstuhlplaetze (no wheelchair facilities) and FehlendeNiederflurwagen (no low floor coach)	KIDS WG	27.11.2019
10.9	Information on product ID (ProduktID) deleted and reference to Section 3.3 added.	KIDS WG	27.11.2019
10.10	Information on transport mode text (VerkehrsmittelText) deleted and reference to Section 3.3 added	KIDS WG	27.11.2019

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
Section 1.4	VDV453 version 2.6 replaced by version 2.6.1.	KIDS WG	07.04.2021
Page 1 Section 1.1 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	Change	Changed by	Changed on
1.2	Versioning of CUS subversions	KIDS WG	29.06.2021
1.4	Redundant Section "1.4 Supported Versions" was removed. The supported versions are listed in Section 1.6.	KIDS WG	29.06.2021
1.6	References modified to new versions	KIDS WG	29.06.2021
2.2.2	Information on matching of AUS/REF-AUS/working timetable	KIDS WG	23.06.2021
2.2.3	Text added on the provision of working data	KIDS WG	29.06.2021
3.3.1	Text added: The optional Haltepositions-Code (stop position code) portion is not used to rail traffic.	KIDS WG	29.06.2021
3.3.3	Text added: The direction ID (RichtungsID) is a static value that remains unchanged across all the messages (AUSRef/AUS) relating to a journey.	KIDS WG	29.06.2021
3.3.5	Text added: The `<BetreiberID>` (operator ID) contains the concessionaire (GO number according to DiDok list [5]) of the lines and journeys supplied. The value supplied must match the one in INFO+.	KIDS WG	29.06.2021

3.3.8	The arrival bay text (AnkunftssteigText) and departure bay text (AbfahrtssteigText) of rail traffic must be transmitted whenever possible.	KIDS WG	23.06.2021
4.2.1	Text adopted from VDV453	KIDS WG	23.06.2021
5.1.1	Other table elements added with description.	KIDS WG	23.06.2021
5.1.2	Table with element description added	KIDS WG	23.06.2021
5.1.3	Other table elements added with description.	KIDS WG	23.06.2021
5.1.3.1	Other table elements added with description.	KIDS WG	23.06.2021
5.1.3.1 5.2.2.1	Vehicle number (VerkehrsmittelNummer) and journey designation text (FahrtBezeichnerText) are mandatory elements for rail traffic. In the Swiss public transport rail system, the train number must be included in both elements.	KIDS WG	23.06.2021
5.1.3.3	Table with element description added	KIDS WG	23.06.2021
5.1.3.4	Table with element description added	KIDS WG	23.06.2021
5.2.1	Other table elements added with description.	KIDS WG	23.06.2021
5.2.2.1	Other table elements added with description.	KIDS WG	23.06.2021
5.2.2.3	Other table elements added with description.	KIDS WG	23.06.2021
5.2.2.8	Table with element description added	KIDS WG	23.06.2021
6.1.11	Note: Specifying Ankunftstatus and Abfahrtstatus =Real (arrival and departure status = real) does not provide any information as to whether a vehicle has effectively stopped at a stop or just travelled through. **The times are transmitted immediately and independently of the `<Durchfahrt>` (non-stopping pass) element.** The `<Durchfahrt>` (non-stopping pass) element is only for planning purposes and not used to retroactively report that a train has travelled through a stop.	KIDS WG	23.06.2021
6.1.12	Text added: In REF-AUS, all stops must always be supplied, even if there is no change of route (and especially in the event of trip cancellations).	KIDS WG	23.06.2021
6.1.13	Description expanded.	KIDS WG	23.06.2021
6.1.15	Description expanded.	KIDS WG	23.06.2021
6.1.16	New section added	KIDS WG	23.06.2021
6.1.17	New section added	KIDS WG	23.06.2021
7	Glossary added	KIDS WG	23.06.2021
1.1 1.4.4 1.4.5 1.4.6 1.3 2.2.3.1 2.3 3.2.6.4	New sections added, which are only relevant to CUS.	KIDS WG	23.06.2021

Section			
5.2.2.4 (and sub-chapter) 5.2.2.5 (and sub-chapter) 5.3.1			

Change history from V 1.5 to 1.6

Section	Change	Changed by	Changed on
1.6	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 repository.	KIDS WG	28.04.2023
3.3.1	Chapter simplified. The specifications for the format inserted as a reference to RV VDV 453. This means that SLOID does not have to be incorporated separately.	KIDS WG	15.12.2021
3.3.5	Reminder of change in V1.5: The <BetreiberID> (operatorID) contains the concessionaire (GO number according to DiDok list [5]) of the delivered lines and trips. The supplied value must match the one in INFO+.	KIDS WG	28.04.2023
5.2.2.2	Reference to SJYID inserted. For details see RV VDV 453	KIDS WG	15.12.2021
2.4	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
5.1.3.1 5.2.2.1	`<FahrtBezeichnerText>`: Description clarified.	KIDS WG	10.05.2022
5.2.2.1 5.2.2.3 6.1.9 6.1.18 6.1.19 6.1.20	PrognoseUngenau and PrognoseQualitaet: For further implementation specifications for Public Transport Switzerland, see the chapters ln 6.1.18, 6.1.19 and 6.1.20.	KIDS WG	20.06.2022

3.3.4 3.3.6	Specifying the examples: In the case of the means of transport category, the name is entered directly in the `<ProduktID>` filled, with the "Angebotskategorie" (offer category) the abbreviation in the `<VerkehrsmittelText>`. ProduktID and VerkehrsmittelText always in upper/lower case in German and consistent with V580 Product 6.	KIDS WG	23.08.2022
3.3.2	Chapter simplified. The specifications for the format inserted as a reference to RV VDV 453. This means that the SLNID does not have to be incorporated separately.	KIDS WG	12.05.2023
10.11	Chapter reduced and moved to RV 453.	KIDS WG	12.05.2023
5.2.1	Element "MitRealZeiten" is not a mandatory element for all elements: In order to provide other partners and the BAV with real times, the subscriptions must always be set to "MitRealZeiten=true" for public transport Switzerland, except for systems that no longer forward real-time data, e.g. information systems.	KIDS WG	27.06.2023

Release status

Version	Changed on	Status
1.0	07.11.2014	Approved by IT committee (VöV)
1.1	21.10.2015	Approved by IT committee (VöV)
1.2	28.04.2017	Reviewed by IT committee and recommended for release
1.2	02.11.2017	Approved by SKI management board
1.3	01.10.2018	Reviewed by IT committee and recommended for release
1.3	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 454 (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 454".[3]
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.

**Implementation rules (VDV-RV 454) as
shared basis across the Swiss public transport system**
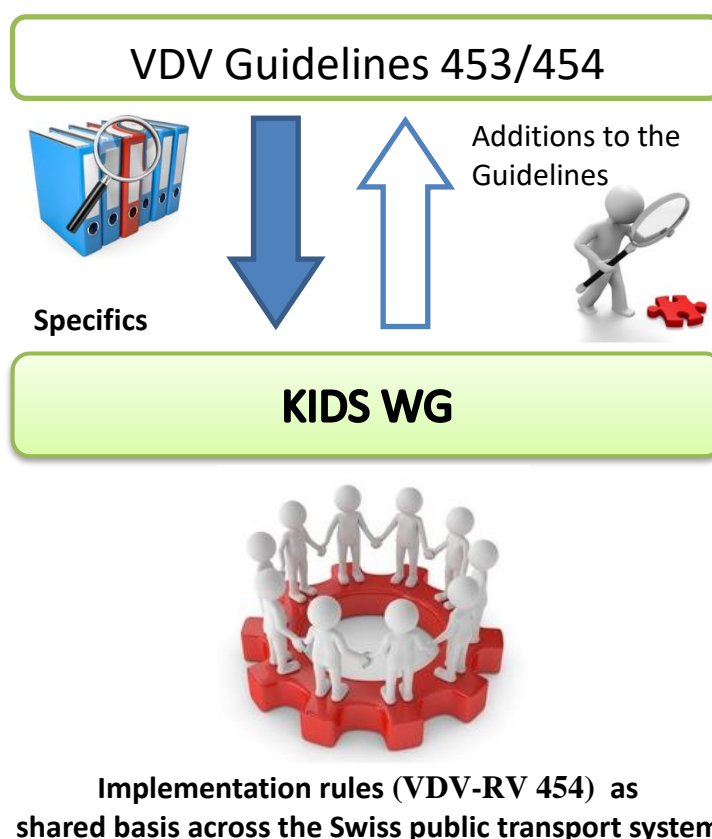
The implementation rules in this document have been agreed upon by the working group „Kundeninformationsdaten-Schnittstellen im öV-Schweiz" (KIDS) (customer information data interface in the Swiss public transport system) and are the result of a standardisation process that concerns the uniform application 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 454)

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

1.2. Versioning of CUS subversions / change log (additions to VDV-RV 454)

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

1.3. On behalf of FOT to the SBB (addition in VDV-RV 454)

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

1.4. Document structure and scope (additions in VDV-RV 454)

1.4.1. Scope

These implementation rules for the Swiss public transport system (VDV-RV 454) supplement the official VDV Guideline 454 [3] and describe only deviations, changes and concretisations of this guideline. This document does **not** therefore replace the official VDV Guideline 454 [3] and does not contain the complete information needed to implement or understand the VDV454 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 VDV interface specification specifies points not described here and may also contain explicit deviations and additions to VDV-RV 454. These bilateral or multilateral specifications (hereinafter referred to as Partner2Partner specifications) should always refer to this VDV-RV 454 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 simplify a direct comparison between the implementation rules and the official VDV Guideline, the section structure of VDV Guideline 454 [3] was adopted throughout this document **from Section 2**.

More specifically, this means that:
- The official VDV Guideline 454 [3] generally applies. The statements and definitions set out there are not repeated in this document[1].
- A **blank section** in this document means that the original VDV Guideline apples without exceptions or additional definitions.

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[1]An exception to this rule will be made if a brief description of the normal case defined in VDV Guideline 454 is required or practical in order to understand a subsequent text or the general context.

- 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 454 [3] purposefully does not make any definitions on metadata for data exchange between VDV partners. Definitions 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 454**)" in the title. This section (including any subsections) does not correspond to the official VDV Guideline 454 [3] and placing it at the end of the section level does not therefore affect other section numbers that follow it.

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. If use deviates from the original VDV Guideline 454[3], the value in this document is shown in red.

Mandatory	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 must 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. This must not result in a processing or validation error.

Table 1: Mandatory and optional fields

1.4.4. Differentiation of the roles of CUS (addition in VDV-RV 454)

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

1.4.5. CUS as data platform (addition in VDV-RV 454*)*

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

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

1.4.6. CUS as rail data producer – DPB (*addition in VDV-RV 454*)

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

1.5. Binding nature (addition in VDV-RV 454)

This document describes how VDV Guideline 454 [3] 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 definitions in this document, the respective partners will need to agree upon metadata not defined here or in the official VDV specification.

1.6. Referenced documents (addition in VDV-RV 454)

[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_V2017d.xsd (version: "2017d"), 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] **VDV453 Implementation rules for Swiss public transport Version 1.6**, Bern (CH), 2023
https://www.xn--v-info-vxa.ch/de/branchenstandard/branchenstandard-kundeninformation-bs-ki/technische-standards

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

[6] Alliance Swiss Pass
V580 – FIScommun / Product no. 06
https://www.allianceswisspass.ch/de/tarife-vorschriften/uebersicht/V580/Produkte-der-V580-FIScommun-1

[7] Using the Forecast Status in VDV454
https://www.xn--v-info-vxa.ch/de/branchenstandard/branchenstandard-kundeninformation-bs-ki/technische-standards

[8] SKI business unit
SKI roadmap.
https://www.xn--v-info-vxa.ch/de/organisation/systemaufgaben-kundeninformation-ski/ski-roadmap

[9] Federal Office of Transport.
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

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

2. Introduction

2.1. General objective

The VDV454 interface aims to transfer timetable data to one or more VDV partners. The data transferred via this interface is also required in order to provide real-time data in information systems.

This document, together with the official VDV Guideline 454 [3], 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 may be exchanged between 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 and master are necessary?
- what needs to be considered when operating the interface?
- how data is to be interpreted when it is not clear from VDV Guideline 454 or when its use deviates from VDV Guideline 454 [3]

(see also the corresponding section in the VDV Guideline [3])

2.2. Requirements for data exchange

(see VDV Guideline 454 [3])

2.2.1. Transfer of updated planning and operating data

(see VDV Guideline 454 [3])

2.2.2. Referencing of actual data

(see VDV Guideline 454 [3])

A distinction can be made between the following possible references:

- AUS service to REF-AUS (actual/forecast/working) → schedule times in seasonal timetable):
    - o Referencing is undertaken via the FahrtID (journey ID) (see Section 5.2.2.2) in VDV454

- AUS service to seasonal timetable (actual/forecast/ working) → schedule times in seasonal timetable):
    - o Background. Today, matching takes place in the information system, e.g. according to the matching defined by the system manufacturer.

- o Desired outcome. Referencing and matching of the data from the VDV service AUS with the seasonal timetable is carried out according to criteria that have been jointly defined by the submitting data producer and the information systems.
- o Via an end-to-end journey reference based on the Swiss journey ID SJYID. The implementation time is shown by the coloured arrows (see [8])

- REF-AUS service to seasonal timetable (working → schedule times in seasonal timetable):
  - o Background. Today, matching takes place in the information system according to the matching algorithm defined by the system manufacturer.
  - o Desired outcome. Referencing and matching of the data from the VDV service REF-AUS with the seasonal timetable is carried out according to the VDV Guideline as per the definition of the line timetables and subject to the criteria established jointly by the data producers and the information systems.

According to the DVD specifications, it must be possible to use the AUS services independently of the REF AUS. The AUS data is therefore referenced either with the daily timetable (REF-AUS) or the seasonal timetable (INFO+). Note: Due to outstanding commitments, not all partners can use the REF-AUS.

The matching criteria required for all referencing to the seasonal timetable (e.g. INFO+ for Swiss public transport) must be specified to the data recipient by the data-producing transport companies. With the introduction of the continuous journey ID, matching can be regulated uniformly via the journey ID.

2.2.3. Provision of target data

(see VDV Guideline 454 [3])

The data relating to seasonal or annual timetables within the Swiss public transport network are collected centrally in the INFO+ timetable database and are available to interested recipients in proprietary HAFAS raw data format[3].

The provision of planning data in AUS service begins for the first time when the preview time is reached within the context of the initial message.

If data recipients also require timetable data which goes beyond the preview time or validity window of the REF-AUS service, this can be obtained via the up-to-date seasonal timetable from INFO+.

It is assumed that the partner has access to the relevant data from the seasonal timetable and that it is therefore possible to map the operational data received to the seasonal timetable.

The relevant data recipient is responsible for ensuring that he/she has the valid data platform as a reference.

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[3] Due to its widespread use, the HAFAS raw data format is unofficially regarded as a "quasi-standard" for the exchange of planning data in public transport Switzerland.

Regarding referencing between the VDV services AUS and REF-AUS to the seasonal timetable, see also Section 2.2.2.

2.2.3.1. Special case: values deviating from the seasonal timetable (*addition in VDV-RV 454*)

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

2.2.4. Definition of values to be used uniformly

(see VDV Guideline 454 [3])

2.3. Authentication and encryption (addition in VDV-RV 454*)*

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

2.4. IDs are not allowed to be interpreted (addition in VDV-RV 454*)*

With the introduction of the new Swiss IDs (SID4PT [10]) and the necessary changes in the XSD2017 in this context, IDs may no longer be interpreted.

3. Introduction and basic terms

3.1. Structure of the interface

(see VDV Guideline 454 [3])

3.2. Timetable information data service AUS

(see VDV Guideline 454 [3])

3.2.1. Overview

(see VDV Guideline 454 [3])

3.2.2. Specialist services REF-AUS and AUS

(see VDV Guideline 454 [3])

3.2.3. Functional scope of REF-AUS

(see VDV Guideline 454 [3])

3.2.4. Functional scope of AUS

(see VDV Guideline 454 [3])

3.2.5. Scope of specialist service DFI

(see VDV Guideline 454 [3])

3.2.6. Data exchange with REF-AUS (addition in VDV-RV 454)

Before the operating day for the individual transport company starts, the recipient should obtain a complete day timetable via the REF-AUS service in accordance with VDV Guideline 454 (Section 3.2.2 and 3.2.3).[3] This creates a common basis for the subsequent subscription of AUS messages.

In processing the REF-AUS data in the recipient system, a time replacement from line timetables is used – same operator ID (BetreiberID), same line ID (LinienID), same direction ID (RichtungsID). This means that all journeys already received for these line timetables are replaced in the transmitted validity period (GueltigVon (valid from), GueltigBis (valid to)) by the newly transmitted journeys from the day timetable (also for the seasonal timetable).
This principle also applies to REF-AUS processing in an information system – even if the data from the seasonal timetable is used there as a basis. In this case, all journeys from REF-AUS are individually matched to the appropriate journeys in the seasonal timetable:

- matching journeys are displayed
- additional journeys from REF-AUS are displayed without the "additional journey" attribute, without using the "additional journey" note.
- Unsubmitted journeys from REF-AUS are removed from seasonal timetable without using the "Failed" indication

This ensures that the number of operated journeys is always determined by the ITCS. The information system can, however, still display additional attributes contained in the period timetable (e.g. subject to surcharge).

The maximum available validity periods and when the target day timetables are available from the respective data producer shall be agreed upon across the entire supply chain (producer, data platform, recipient) (see Section 3.2.6.3).

3.2.6.1. Day timetable

A day timetable consists of a number of line timetables and a line timetable of a number of scheduled journeys.
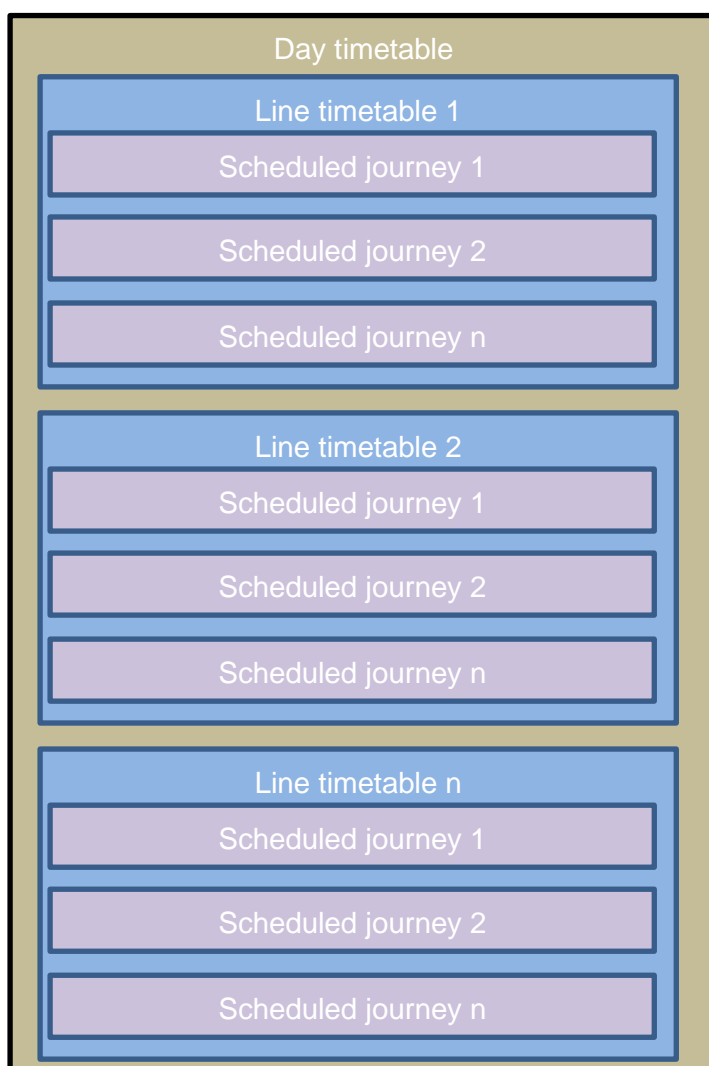
Complete line timetables across the defined validity period (GueltigVon (valid from), GueltigBis (valid to)) are transferred via VDV454 REF-AUS. Each line timetable contains all scheduled journeys that start before or within the validity period and have at least one stop within the validity period (VDV Guideline 454, section 5.1.1: MitBereitsAktivenFahrten=true).

The following rules must be observed in the process

- A line timetable must always be transferred completely in one message. Dividing it up across multiple packets (e.g. DatenAbrufenAntworten via WeitereDaten=true) is not permitted. A line timetable always contains all journeys that are operated for the de-fined validity period. Scheduled journeys that are not transferred in the line timetable

are not operated; new scheduled journeys are interpreted as additional journeys and the "additional journey" flag is applied by the recipient as per the transferred scheduled journey.

- A blank line timetable is also a complete line timetable. A blank line timetable therefore deletes all journeys for the defined validity period
- If the recipient cannot interpret scheduled journeys, it is a good idea to discard the complete line timetable, or it at least needs to be considered whether it is better to discard the scheduled journeys that cannot be interpreted (which are then no longer operated) or discard the entire line timetable.
- If a line timetable cannot be delivered in full for the agreed validity period as per the subscription, then it should not be transferred; otherwise, all journeys that are not transferred will be deleted.
- If a line timetable is not transferred, the recipient's line timetable continues from its most recent transfer status (REF-AUS or period timetable).
- Scheduled journeys in the line timetable can be marked as cancelled with the flag FaelltAus=true (cancelled = true). If scheduled journeys are simply omitted, it is recommended for the recipient to delete the journey and not set the FaelltAus flag.

3.2.6.2. Transmission sequence for REF-AUS and AUS

According to VDV Guideline 454 [3](section 3.2.2 and 3.2.3), the day timetables should first be synchronised (the recipient has the same target data as the sender) and then changes to the day timetable are subscribed via the AUS service.

Reason:
- AUS messages will otherwise be transferred without the recipient's and supplier's data pools being synchronised
- Obsolete or incorrect data pools may be displayed.
  - o Additional journeys from REF-AUS are not displayed in the AUS service or are only displayed when the first journey is transferred.
  - o Cancelled journeys continue to be displayed.
  - o Route changes from REF-AUS are not displayed in the AUS service or are only displayed when the first journey is transferred.
  - o Compositions are not displayed in the AUS service or are only displayed when the first journey is transferred.
  - o Actual journeys from the AUS service must be compared against the period timetable. If a journey cannot be compared, journeys may not be deleted or may be duplicated.
  - o Etc.

3.2.6.3. Organisational agreement in CUS for the transfer of REF-AUS data

In order to issue subscriptions over the correct subscription period and with the right validity period, an organisational agreement is needed across the entire supply chain.

- Which subscription periods and validity periods for this day timetable can be defined is agreed upon organisationally across the entire supply chain (producer, data platforms, recipient).
- All CUS suppliers agree to deliver their line timetables in CUS by 04:00 at the latest on the day of operation, with a validity period running from 04:30 to 04:30 of the following day at a minimum.

- CUS as the data platform can only check whether the received line timetables comply with the recipient's validity period once the line timetables are received from the suppliers, which is why CUS confirms the recipient's subscription without checking whether it can deliver this data in each case. It is ensured, however, that only data that matches the subscription is delivered. If this is not the case, no line timetables are delivered.
- The recipient always orders at least the minimum validity period from 04:30 to 04:30 of the following day.

The graphic shows how REF-AUS data can be transferred via a data platform (CUS in this case).
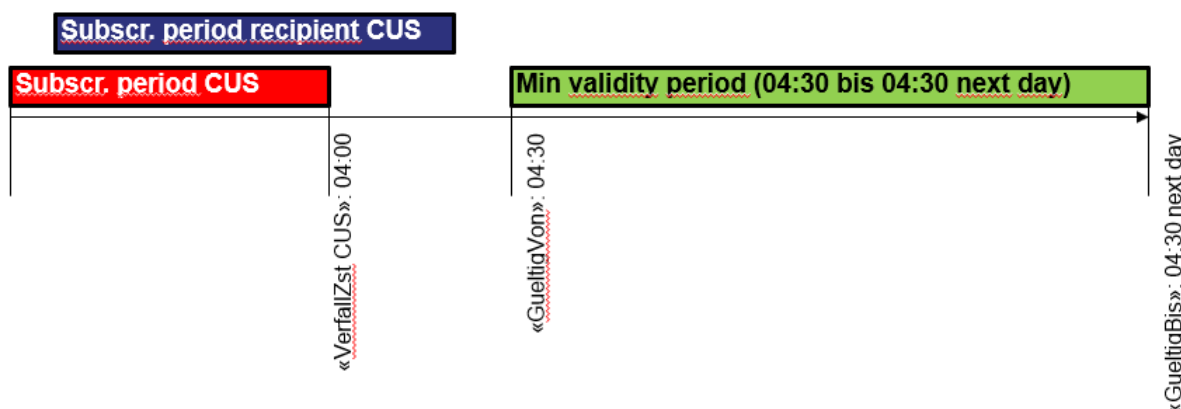
Sample table for organisational agreement:

Operator	Operator > CUS (inbound)				CUS > recipient (outbound)			
	Time range for subscription query		Day timetable		Time range for subscription query		Day timetable	
	Subscription query	Subscription expiry	Valid from	For duration of	Subscription query	Subscription expiry	Valid from	For duration of
Partner 1	03:30	04:00	04:30	24:45 h	04:00	04:30	04:30	24:45h
Partner 2	03:30	04:00	04:30	30 h	04:00	04:30	04:30	30h
Partner 3	23:00 (previous day)	01:00	04:30	48 h	01:30	02:30	04:30	30h

This table is maintained by Fachbus CUS in accordance with the agreements.

3.2.6.4. CUS blocking times (*addition in VDV-RV 454*

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

3.3. Metadata, mapping of stops and lines

(see VDV Guideline 454 [3])

3.3.1. Stop information (HaltID) (addition in VDV-RV 454)

(see VDV Guideline 454 [3])

The `<HaltID>` (stop ID) element describes the stop, and optionally the stopping point to which a vehicle travels.

Format:

The "HaltID" should be specified at the finest granularity available, if possible, and should also be treated the same in the application of the VDV453 [1] and VDV454 [3]. The conversion to SLOID [10] is also taken into account there.

3.3.2. Line id (LinienID)

(see VDV Guideline 454 [3])

The LineID together with the OperatorID must always be unique.

Note on REF-AUS:
If a line is operated by multiple transport companies and delivered to recipient systems via separated ITCS, these ITCS and the data cancel each other out. These types of line must be divided into two separate lines (with separate line ID or separate operator ID) similar to the ITCS.

The format of the "LinienID" is defined in the realization specification VDV-RV 453 [4], chapter 6.1.6 Line and direction references [4]. The conversion to the SLNID [10] is also taken into account there.

3.3.3. Direction ID (RichtungsID) – (addition in VDV-RV 454)

(see VDV Guideline 454 [3])

Recommendation: When journeys are transmitted, the direction ID (RichtungsID) value, which is transmitted via VDV454 services, should match the value from the "ID for direction" field for the corresponding journey from the seasonal timetable (e.g. INFO+). A maximum of two values per line may be supplied with one character. The values "H" and "R" are recommended.

The direction ID is a static value that must remain unchanged across all the messages (REF-AUS/AUS) relating to a journey.

3.3.4. Product ID (ProduktID) – (addition in VDV-RV 454)

(see VDV Guideline 454 [3])

The vehicle category is communicated as the `<ProduktID>` (product ID) in the Swiss public transport system (e.g. boat, bus, train, etc.). The data-producing transport company must ensure in the process that the vehicle categories [6] transmitted match the vehicle categories used in the timetable collection in the Swiss public transport system (INFO+).

Note
- Specifying the product ID (ProduktID) 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 [6]. The use of German-language values, incl. upper and lower case, are mandatory and must be adhered to across the Swiss public transport system 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.

3.3.5. Operator ID (BetreiberID) – (addition in VDV-RV 454)

(see VDV Guideline 454 [3])

The `<BetreiberID> (operator ID)` contains the concessionaire (GO number according to DiDok list) [5]) of the lines and journeys supplied. The value supplied must match the one in INFO+.

The operator ID is a mandatory field in the Swiss public transport system and must be specified in the following format:

[**UIC country code**]:[**UIC code**] (**UIC country code: business organisation no.**)

Definitions:

Identifier	Meaning	Example
UIC country code)	The country code of the transport undertaking (as per UIC) operating the journey. Numeric value with max. 2 digits	85
UIC code (business organisation number)	Number of the business organisation of a transport company operating the journey, as per the FOT DiDok list or reference for the country in question.[5] (Synonym: TU-Code, or transport company code.) The number should not start with a leading zero. These must be adhered to across the Swiss public transport system whenever possible. Max. six-digit alphanumerical value (permissible characters are { A-Z, a-z, 0-9, _ }). The business organisation number (UIC code) must be identical in the journey identifier (FahrtBezeichner) and line ID (LinienID) elements. If the numbers are different, it may not be possible to process the journey (inconsistencies).	37

An operator can deliver either rail or local transport services data with an operator ID (BetreiberID). If an operator needs to deliver both rail and local transport data, these must be delivered with different operator IDs even if both use the same line (e.g. use of buses in place or trains at off-peak times).

Note
It must be possible to subscribe to the product "Bahn" (rail) even without local transport data (including filtering). Until all systems can deliver the product ID (ProduktID) and have consistently implemented a product filter (ProduktFilter), this interim solution involving a separate operator ID (BetreiberID) for rail and local transport must remain in place.

3.3.6. Vehicle text (VerkehrsmittelText) – (addition in VDV-RV 454)

The abbreviation of the service category (e.g. ICE, RE, R, S, B, T, FUN, LB, etc.) is transmitted as <TransportText> in Public Transport Switzerland. The data-producing TU must ensure that the transmitted "VerkehrsmittelText" corresponds to the German-language service categories [6] used in the timetable collection of ÖV-Schweiz (INFO+), including upper/lower case.

Note
- Specifying the product ID (ProduktID) is partly used for the assignment of pictograms in the information systems.
- The current offer categories can be found on the home page of Alliance SwissPass [6]. These must be adhered to across the Swiss public transport system 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 offer categories.
- Deviating offer categories from foreign transport companies are accepted as delivered by the transport companies and transmitted in an unchanged format to relevant data recipients.

3.3.7. Line text (LinienText) – (addition in VDV-RV 454)

The `<LinienText>` (line text) element is publication-relevant and must therefore be forwarded to the information system and displayed there in the format of consistent customer information as prepared by the data supplier.

The line text is a matching criterion for certain information systems and should therefore match the line number in INFO+. The line text in the HDRF in Switzerland corresponds to the short name (code: N T).

Line text in rail traffic:
In VDV454 services, the publication-relevant line designation (PLB) is transmitted in the `<LinienText>` (line text) element.

In CUS this is composed of the following elements:

Offer category	Line number	Line text (LinienText)
S		S
S	1	S1
IC		IC
Inter-City Express		ICE
R		R
S	L1	SL1

In rail traffic, the PLB is delivered to CUS, but subdivided into vehicle text (Verkehrsmittel-telText) (offer category) and line text (LinienText) (line number):

- PLB = S1
    - CUS (VDV454 delivery)
        - VerkehrsmittelText (vehicle text) = S
        - LinienText (line text) = 1 or LinienText = S1
    - INFO+ (delivery)
        - Category = S
        - Line = 1
    - Note: Delivery from CUS in the line text: S1 (as per table above).

- PLB = R
    - CUS (VDV454 delivery)
        - VerkehrsmittelText = R
        - LinienText = "blank" or R
    - INFO+ (delivery)
        - Category = R
        - Line = blank
    - Delivery from CUS in the line text: R (as per table above).

3.3.8. Arrival/departure bays (AnkunftssteigText, AbfahrtssteigText) - (Addition in VDV-RV 454)

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

In rail traffic, the track must be transmitted in the element "AbfahrtssteigText" whenever possible.

3.3.9. Arrival/departure sectors (AnkunftsSektorenText, AbfahrtsSektorenText) - (addition in VDV-RV 454)

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).

3.4. Estimation of data quantities

(see VDV Guideline 454 [3])

3.5. Estimation of data currency

(see VDV Guideline 454 [3])

See also Section 6.1.8 for more detailed information about delays.

3.6. Time formatting

(see VDV Guideline 454 [3])

3.7. Operating day (addition in VDV-RV 454)

(see also VDV453 RV [4] Section 6.1.1)

4. "Basic infrastructure" interface description

4.1.   Preliminary remarks

(see VDV Guideline 454 [3])

4.2.   Subscription procedure

(see VDV Guideline 454 [3])

4.2.1.   Dividing large data packets (*addition in VDV-RV 454)*

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 more data (Weitere-Daten) mechanism or not.

Data packets that are associated with each other must be transmitted without delay.

4.3.   Logs

(see VDV Guideline 454 [3])

4.4.   Service ID/Query URL (Dienstekennung / Anfrage-URL)

(see VDV Guideline 454 [3])

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

4.4.1.   Control point ID (Leitstellenkennung) – (addition in VDV-RV 454)

The control point ID is included in both the access URL and in the message itself in the form of the `sender` XML attribute.

In addition to the **sender of a message** (system ID), the control point ID also identifies the **platform** from which a message has been sent (platform ID). Both components are connected with a "_" (under-score sign) between them.

<Systemkennung>_<Plattformkennung>

It is recommended to specify the control point identifier in lowercase letters.

The system ID (Systemkennung) can be freely selected. The underscore sign "_", however, must not be used as part of 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
Development	entw
Test	test
Integration	int
Production	prod

Table 2: 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.

Examples of valid control point IDs are: zvv_test, zvv_prod, riv_prod, sbb_int, sbb_prod, sip_hub_test, sip_hub_prod.

4.5. Reused data types

(see VDV Guideline 454 [3])

In relation to the VDV454 services, please explicitly follow the specifics from VDV-RV 453 [4] regarding the following reused data types:

Element	Remarks	Specifics in VDV-RV 453 [4]
DatenAbrufenAntwort (data supply answer)	The separation of data for a subscription. Include as much detail as possible	Section 5.1.4.2
FahrtID (journey ID)	Specifics concerning mandatory field and formatting of `<FahrtID>` (journey ID) and use and consistency of <FahrtBezeichner> (`journey identifier`) (VDV453/454)	Section 6.1.5
LinienID (line ID)	Specifics concerning formatting, use and consistency of `<LinienID>` (VDV453/454)	Section 6.1.6

4.5.1. Status query (StatusAnfrage) and status reply (StatusAntwort) – (addition in VDV-RV 454)

Client side

If a client receives a "`notok`" back in the `<StatusAntwort>` (status reply) to a sent `<StatusAnfrage>` (status query), it must 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>` (status query) (see also VDV Guideline 453 [1], section 5.1.8][1].

4.6. Use of optional fields

VDV-RV 454 follows the definitions of VDV Guideline 454 [3]in this case in principle. For data recipients, this means that they always have to compare newly received data against data that was received prior, in order to have all information for a journey. Data in optional elements that were specified in a previous message retain their validity even if they are no longer explicitly specified in a subsequent change message (except when transmitting complete journeys).

5. Specialist services

5.1. Target data service REF-AUS

(see VDV Guideline 454 [3])

5.1.1. Timetable data query (*AboAUSRef*)

(see VDV Guideline 454 [3])

The following table contains only changes to VDV- 454:

Element	Comments	Field
LinienFilter (line fil-ter)	(see VDV Guideline 454 [3]) Subscribing to individual vehicle numbers in rail transport is not permitted	optional
BetreiberFilter (operator filter)	(subelement, mandatory/optional, multiple) Filter for the transport company for which day timetables are to be sent. The element contains the operator ID (`<Be-treiberID>`) for which the subscriber is requesting data (see VDV Guideline 454 [3], Section 5.1.1.3. Operator filter not set: All of the **target** data known to the ITCS must be transmitted (subject to other filters or limita-tions). For all data platforms delivered in CUS and ITCS with two operators or more, the operator filter (outbound) must be implemented; for all others implementation is optional. Data suppliers that have not yet implemented the opera-tor filter (`<BetreiberFilter>`) must respond to a sub-scription query (`<AboAnfrage>`) with an operator filter (`<BetreiberFilter>`) with "notok" and an error num-ber 3xx. Using the operator filter is recommended for all data re-cipients, as otherwise all new operators will automatically be taken from the server.	Optional / mandatory (see notes)

Element	Comments	Field
MitBereitsAktivenFahrten (with already active journeys)	(see VDV Guideline 454 [3]) This element should always be transmitted with the value "true" in the Swiss public transport system. From version 3.0 the element is omitted and the value "true" is instead always accepted. All journeys that start before the validity period and have at least one stop within the validity period are also transmitted with this parameter.	mandatory
ProduktFilter (product filter)	(see VDV Guideline 454 [3])	optional
VerkehrsmittelTextFilter (vehicle text filter)	(see VDV Guideline 454 [3])	optional
HaltFilter (stop filter)	(see VDV Guideline 454 [3])	optional
UmlaufFilter (block filter)	(see VDV Guideline 454 [3])	optional
MitGesAnschluss (with protected connection)	(see VDV Guideline 454 [3])	optional
MitBereitsAktivenFahrten (with already active journeys)	(see VDV Guideline 454 [3])	optional
MitFormation (with composition)	(see VDV Guideline 454 [3])	optional

Use of placeholders in the Swiss public transport system:
Two partners can agree to use placeholders in the filter criteria. The following characters are allowed:
- the asterisk * represents any number of characters (letters or numbers), or for no character at all.
- the question marks? represents exactly one character (letter or number)
- The hash # represents exactly one digit of a number.

Please note: the use of placeholders in the Swiss Public transport system is voluntary and must be explicitly agreed upon between two partners.

5.1.2. Transmitting data (AUSNachricht)

(see VDV Guideline 454 [3])

5.1.3. Line-oriented timetable data transmission (Linienfahrplan) (line timetable)

Changes to VDV Guideline 454 [3]:

Element	Comments	Field
ProduktID (Product ID)	(see VDV Guideline 454 [3]) The product ID must be specified in the line timetable, in all scheduled journeys or in both structures. Warning: The field is mandatory from XSD2017 (and retrospectively for XSD2015).	mandatory/optional (see notes
BetreiberID (operator ID)	(See Section 3.3, BetreiberID) The `<BetreiberID>` `(operator ID)` contains the concessionaire (GO number according to DiDok list) [5]) of the lines and journeys supplied. The value supplied is used for sharing a time-limited section of the line timetable and must always correspond to the one in INFO+.	mandatory
LinienText (line text)	(See VDV Guideline 454[3] and Section 3.3) <u>Local traffic:</u> The `<LinienText>` line text is often used by information systems to match the journeys to the seasonal timetable.	optional/mandatory
RichtungsText (direction text)	(See VDV Guideline 454[3] and Section 6.1.17)	optional
VonRichtungsTex (from direction text)	(See VDV Guideline 454[3] and Section 6.1.17)	optional
VerkehrsmittelText (vehicle text)	(see VDV Guideline 454 [3]) Identifier for the offer category of the scheduled journeys in a line timetable. (See also Section 3.3 VerkehrsmittelText) The offer category (`<VerkehrsmittelText>`) element can be overridden for each scheduled journey. (see VDV Guideline 454 [3], Section 5.1.3.1) The offer category (`<VerkehrsmittelText>`) must be specified in the `<Linienfahrplan>` (line timetable), in all scheduled journeys or in both structures. **Warning:** The field is mandatory from XSD2017 (and retrospectively for XSD2015).	Mandatory/optional (see notes)

Element	Comments	Field
PrognoseMoeglich (forecast possible)	(See also Section 6.1.10.) This element is no longer present in the XSD2017, REF-AUS. **Warning:** The field is optional in XSD2015 optional and has been removed in XSD2017.	Was removed from XSD2017.
FahrradMitnahme (accompanied bicycles)	(see VDV Guideline 454 [3])	optional

5.1.3.1. Single journey data (scheduled journey)

(see VDV Guideline 454 [3])

Changes to VDV Guideline 454 (cf. [3] Section 5.1.3.1):

Element	Comments	Field
SollHalt (scheduled stop)	(See VDV Guideline 454[3] and Section 5.1.3.3) All stops must always be transmitted.	mandatory
UmlaufID (block ID)	(see VDV Guideline 454 [3])	optional
KursNr (run number)	(see VDV Guideline 454 [3])	optional
FahrtBezeichnerText (journey description text)	(see VDV Guideline 454 [3]) The train number must always be transmitted in this element for rail traffic in Switzerland.	optional / mandatory
VerkehrsmittelNummer (vehicle number)	(see VDV Guideline 454 [3]) The train number must always be transmitted in this element for rail traffic in Switzerland. When converting from XSD2015 to XSD2017, the train number is transmitted in the `<VerkehrsmittelNummer>` element.	optional / mandatory

Element	Comments	Field
Line text (LinienText)	(See VDV Guideline 454[3] and Section 3.3) Line identifier relevant to the public <u>Local traffic:</u> The `<LinienText>` (line text) is often used by information systems to match the journeys to the seasonal timetable.	optional/mandatory
ProduktID (Product ID)	(see VDV Guideline 454 [3]) The `<ProduktD>` must either be specified in the line timetable or in all scheduled journeys. **Warning:** The field is mandatory from XSD2017 (and retrospectively for XSD2015).	mandatory/optional (see notes)
RichtungsText (direction text)	(see VDV Guideline 454 [3])	optional
VonRichtungsText (from direction text)	(see VDV Guideline 454 [3])	optional
HinweisText (explanatory information)	(see VDV Guideline 454 [3])	optional
Zugname (Name of train)	(see VDV Guideline 454 [3]) The marketing name is included in the train name (*Zugname*) element (see [6])	optional
VerkehrsmittelText (vehicle text)	(see VDV Guideline 454 [3]) The <VerkehrsmittelText> (offer category)must be stated either in the line timetable (<Linienfahrplan>) or in all scheduled journeys. **Warning:** The field is mandatory from XSD2017 (and retrospectively for XSD2015).	mandatory/optional (see notes)
Zusatzfahrt (extra journey)	(see Section 6.1.4 6.1.13)	optional
PrognoseMoeglich (forecast possible)	(See also Section 6.1.10.) This element is no longer present in the XSD2017, REF-AUS. **Warning:** The field is optional in XSD2015 optional and has been <u>removed</u> in XSD2017c.	Was removed from XSD2017.

Element	Comments	Field
FahrradMitnahme (Accompanied bicycles)	(see VDV Guideline 454 [3])	optional
FahrzeugTypID (vehicle type ID)	(see VDV Guideline 454 [3])	optional
ServiceAttribut (service attribute)	(see VDV Guideline 454 [3]) The service attributes are predefined in the Swiss public transport system, see also Section 10.11.	optional
SollFormation (scheduled composition)	(see VDV Guideline 454 [3] and Section 5.1.3.4 and 5.2.2.4)	optional
FahrtBeziehungen (journey relationships)	(See Section 5.4)	optional

5.1.3.2. Information on the journey service (ServiceAttribute)

(See VDV Guideline 454 [3] and Section (10.11)

5.1.3.3. Information on the stop (scheduled stop)

(see VDV Guideline 454 [3])

It is always mandatory to state all the commercial stops of a vehicle's journey. They are specified as a list of `<SollHalt>` elements which are sorted in ascending order in the effective order of operating points travelled.

The following table contains only changes to VDV Guideline 454:[3]

Element	Comments	Field
AbfahrtssteigText (departure bay/platform text)	(See VDV Guideline 454[3] and Section 3.3.8) Details of boarding area (e.g. platform) <u>without</u> sector. Does not apply to the end stop. **N.B:** In all VDV 453 and 454 services from XSD2017 on, track and sector information are supplied in two separate fields. A blank xxxSteigText (xxx bay/platform text) deletes all the information previously transmitted.	optional
AnkunftssteigText (arrival bay/platform text)	(See VDV Guideline 454[3] and Section 3.3.8) As for the departure bay text (AbfahrtssteigText) Does not apply to the departure stop.	optional

Element	Comments	Field
AbfahrtsSektoren (departure sectors text)	(see VDV Guideline 454 [3]) Does not apply to the end stop.	optional
AnkunftsSektoren-Text (arrival sector text)	(see VDV Guideline 454 [3]) As for the departure sectors text (AbfahrtsSektorenText). Does not apply to the departure stop.	optional
Einsteigeverbot (no boarding):	(see VDV Guideline 454 [3])	optional
Aussteigeverbot (no alighting):	(see VDV Guideline 454 [3])	optional
Durchfahrt (non-stopping pass)	(see VDV Guideline 454 [3], Section 6.1.11 and entry in Section 7 Glossary on extraordinary non-stopping passes). Scheduled non-stopping passes are normally not transmitted. Exception: In the case of changes in composition at hypothetical service stops, non-stopping passes may also be reported for these service stops.	optional
HinweisText (explanatory information)	(see VDV Guideline 454 [3])	optional
SollAnschluss (scheduled connection)	(see VDV Guideline 454 [3])	optional

The formats are defined in Section 3.3.

5.1.3.4. Information on the composition of the scheduled journey (SollFormation)

(see VDV Guideline 454 [3])

5.1.3.5. Scheduled connections (SollAnschluss)

(see VDV Guideline 454 [3])

5.1.4. Block-related journey data transmission (SollUmlauf)

(see VDV Guideline 454 [3])

5.2. Actual data service AUS

5.2.1. Actual data query (AboAUS)

(see VDV Guideline 454 [3], incl. subsections)

The following table contains only changes to VDV Guideline 454:

Element	Comments	Field
LinienFilter (line filter)	(see VDV Guideline 454 [3]) Subscribing to individual vehicle numbers in rail transport is not permitted	optional
BetreiberFilter (operator filter)	(see VDV Guideline 454 [3]) Using the operator filter is recommended for all data recipients, as otherwise all new operators will automatically be taken from the server.	Optional / mandatory (see notes)
HaltFilter (stop filter)	(see VDV Guideline 454 [3])	optional
UmlaufFilter	(see VDV Guideline 454 [3])	optional
Delay	(see VDV Guideline 454 [3])	mandatory
MitGesAnschluss (with protected connection)	according to VDV Guideline 454 [3]	optional
MitRealZeiten (with real times)	(see VDV Guideline 454) In order to provide real times to other partners and the BAV, the subscriptions must always be set with "MitRealZeiten=true" in the Swiss public transport, except for systems that no longer forward real-time data, e.g. information systems. In the Swiss public transport system, delivery of real-time information to the FOT and therefore in the CUS is mandatory for all transport companies. CUS therefore sets all subscriptions exclusively with the `<MitRealZeiten=true>` (with real time = true) parameter. Every supplier must be able to work with this (see Section 1.4.3).	mandatory
MitFormation (with composition)	(see VDV Guideline 454 [3])	optional
NurAktualisierung (update only)	(see VDV Guideline 454 [3])	optional

Use of placeholders in the Swiss public transport system:

Two partners can agree to use placeholders in the filter criteria. The following characters are allowed:

- the asterisk * represents any number of characters (letters or numbers), or for no character at all.
- the question marks? stands for exactly one character (letter or number)

- The hash # represents exactly one digit of a number.

Please note: the use of placeholders in the Swiss Public transport system is voluntary and must be explicitly agreed upon between two partners.

5.2.2. Transmitting actual data

(see VDV Guideline 454 [3])

For all suppliers that deliver in CUS, the first message in the AUS service must always be a complete journey, to ensure an initial status in each case for the journey, which is independent of the service. The also applies to any change from "false" to "true" in PrognoseMoeglich (forecast possible).

If the `<DatensatzAlle>` (dataset all) element `<DatenAbrufenAnfrage>` (data query) is set to `true`, all the journeys that are active and relevant at the time are transmitted as complete journeys. The partners concerned must decide among themselves whether existing journeys are relevant.

5.2.2.1. Actual data for a journey (IstFahrt)

(see VDV Guideline 454 [3])

In contrast to VDV Guideline 454 (cf.[3], Section 5.1.3), there are additional mandatory elements and specifications for:

Element	Comments	Field
LinienID (line ID)	(see Section 3.3.2 and VDV Guideline 454 [3]) "Technical line reference": Technical number for identifying the line. Can deviate from the publication-relevant line reference in the `<LinienText>` (element line text) element.	mandatory
RichtungsID (direction ID)	(See VDV Guideline 454[3] and Section 3.3)	mandatory
Komplettfahrt (complete journey)	(see VDV Guideline 454 [3]) In the case of a complete journey, it is expected that the scheduled and actual stops are already provided to the data suppliers in the correct order in which they run.	mandatory
UmlaufID	(see VDV Guideline 454 [3])	optional
KursNr (run number)	(see VDV Guideline 454 [3])	optional

Element	Comments	Field
BetreiberID (operator ID)	(See VDV Guideline 454[3] and Section 3.3, operator ID (BetreiberID) The Transportunternehmung (business organisation number as per the DiDok list [5] that is commissioned (by FOT, the canton, etc.) to run this journey and holds the concession for it is always specified in the operator ID (BetreiberID). It does not matter whether they run this journey themselves or commission another (third-party) transport company to do it.	mandatory
IstHalt (scheduled stop)	(See VDV Guideline 454[3] and Section 5.1.3.3)	optional
FahrtBezeich-nerText (journey description text)	(see VDV Guideline 454 [3]) The train number must always be transmitted in this element for rail traffic in Switzerland.	optional / mandatory
VerkehrsmittelNummer (vehicle number)	(see VDV Guideline 454 [3]) The train number must always be transmitted in this element for rail traffic in Switzerland. When converting from XSD2015 to XSD2017, the train number is transmitted in the element `<Verkehrsmittel-Nummer>`.	optional / mandatory
Line text (Linien-Text)	(See VDV Guideline 454 and [3] Section 3.3) Line identifier relevant to the public Local traffic: The line text is often used by information systems to match the journeys to the seasonal timetable.	op-tional/man-datory
ProduktID (Product ID)	(See VDV Guideline 454[3] and Section 3.3, ProduktID) **Warning:** The field is mandatory from XSD2017 (and retrospectively for XSD2015).	mandatory
RichtungsText (direction text)	(See VDV Guideline 454[3] and Section 6.1.17)	optional
VonRichtungsText (from direction text)	(See VDV Guideline 454[3] and Section 6.1.17)	optional

Element	Comments	Field
Zugname (name of train)	(see VDV Guideline 454 [3]) The marketing name is included in the train name (*Zugname*) element (see [6])	optional
VerkehrsmittelText (vehicle text)	(See VDV Guideline 454[3] and Section 3.3) **Warning:** The field is mandatory from XSD2017 (and retrospectively for XSD2015).	mandatory
PrognoseMoeglich (forecast possible)	(see VDV Guideline 454 [3], Section 6.1.10 and 5.2.2 **N.B.:** Behaviour has changed with XSD2017. See also the `<FahrtZuruecksetzen>` field below. For further implementation specifications for "PrognoseMoeglich" and "PrognoseUngenau" = "missing update", see chapter 6.1.20.	optional
PrognoseUngenau (forecast inaccurate)	(see VDV Guideline 454 [3]) (see also the fields `<Ist*PrognoseStatus>`) For further implementation specifications, see chapters 6.1.18, 6.1.19 and 6.1.20.	optional
Zusatzfahrt (extra journey)	(See VDV Guideline 454[3] and Section 6.1.13) true, if an additional journey (e.g. special train) is involved. No specification: no change to the planned schedule or the last message.	optional
FaelltAus (cancelled)	(see VDV Guideline 454 [3]) **N.B.:** The completely cancelled scheduled journey or total cancellation of an IstFahrt) scenario has changed in XSD2017 All actual stops for the last complete journey must now be delivered prior to the cancellation message.	optional/ mandatory
FahrtZuruecksetzen (reset journey)	(See VDV Guideline 454 [3], Section 6.1.10 and 5.2.2)	optional
Accompanied bicycles (FahrradMitnahme)	(see VDV Guideline 454 [3])	optional

Element	Comments	Field
Vehicle type ID (FahrzeugTypID)	(see VDV Guideline 454 [3])	optional
ServiceAttribut (service attribute)	(see VDV Guideline 454 [3]) The service attributes are predefined in the Swiss public transport system, see also Section 10.11.	optional
IstFormation (actual composition)	(See VDV Guideline 454 <u>and</u> [3] Section 5.2.2.4))	optional
FahrtBeziehungen (journey relationships)	(see Section 5.4)	optional

5.2.2.2. Referencing the journey data

(see VDV Guideline 454 [3])

<u>In contrast to VDV Guideline 454 (cf.[3], Section 5.2.2.2), the FahrtID (journey ID) is a mandatory field:</u>

Element	Comments	Field
FahrtID (journey ID)	(see Section 2.2.2 and VDV Guideline 454 [3]) The journey ID (`<FahrtID>`) must always be specified, as it is needed in the Swiss public transport system to reference the actual journeys (`<IstFahrt>` elements) (AUS) and for mapping to scheduled journeys (REF-AUS). Concerning the format of `<FahrtBezeichner>` (`journey identifier`), see VDV-RV 453 [4], Section 6.1.5. The conversion to the SJYID [10] is also taken into account there.	mandatory

5.2.2.2.1. Alternative referencing information (FahrtStartEnde)

(see VDV Guideline 454 [3])

5.2.2.3. Information on the Stop (IstHalt)

(see VDV Guideline 454 [3])

The formats are defined in Section 3.3.

In addition, more detail is provided on the process for transmitting a forecast status in the document "Using the Forecast Status in VDV454" [7]. This document applies to all versions of the VDV454 implementation rules in the Swiss public transport system.

Element	Comments	Field
IstAbfahrtPrognoseSta-tus (Actual departure forecast status)	(See VDV Guideline 454 [3] and Section 6.1.1) **N.B:** The event `<Ist*PrognoseStatus=Un-bekannt>` (actual * forecast status=unknown) is handled differently by CUS than described in the VDV454 Guideline and implementation rules. It is possible that implausible time forecast sequences could be reported in some cases. See also Section 6.1.1. CUS as rail data producer – DPB (client): Information is mandatory when submitting data for railway production. CUS requires the information directly on departure to correctly determine and publish the connections.	General: optional Real times@ **- Local traffic**: optional **- Rail: mandatory**, exceptions are possible by mutual agreement
IstAnkunftPrognoseSta-tus (actual arrival forecast status)	(See VDV Guideline 454 [3] and Section 6.1.1) See 'IstAbfahrtPrognoseStatus' above.	General: optional Real times@ **- Local traffic**: optional **- Rail: mandatory**, exceptions are possible by mutual agreement
IstAbfahrtProg-noseQualitaet (actual departure forecast quality)	(see VDV Guideline 454 [3]) The changeover to the SJYID [10] is also considered there. For further implementation specifications in ÖV Schweiz, see chapters 6.1.18, 6.1.19 and 6.1.20.	optional
IstAnkunftProg-noseQualitaet (actual arrival forecast quality)	(see VDV Guideline 454 [3]) The changeover to the SJYID [10] is also considered there. For further implementation specifications in ÖV Schweiz, see chapters 6.1.18, 6.1.19 and 6.1.20.	optional

Element	Comments	Field
IstAbfahrtDisposition (expected departure time)	(see VDV Guideline 454 [3]) Is not supported for rail travel.	optional
IstAnkunftDisposition (expected arrival time)	(see VDV Guideline 454 [3]) Is not supported for rail travel.	optional
PrognoseUngenau (forecast inaccurate)	(See VDV Guideline 454[3] and Section 6.1.9) The changeover to the SJYID [10] is also taken into account there. For further implementation specifications in ÖV Schweiz, see chapters 6.1.18, 6.1.19 and 6.1.20.	optional
AbfahrtssteigText (departure bay/platform text)	(See VDV Guideline 454[3] and Section 3.3.8) Details of boarding area (e.g. platform) <u>without</u> sector. Does not apply to the end stop. **N.B:** In all VDV 453 and 454 services from XSD2017 on, track and sector information is supplied in two separate fields. A blank xxxSteigText (xxx bay/platform text) deletes all the information previously transmitted. •	optional
AnkunftssteigText (Arrival bay/platform text)	(See VDV Guideline 454[3] and Section 3.3.8)f As for the departure bay text/platform text (`<AbfahrtssteigText>`) Does not apply to the departure stop.	optional
AbfahrtsSektoren (departure sectors text)	(see VDV Guideline 454 [3]) Does not apply to the end stop. See departure bay/platform text (`<AbfahrtssteigText>`) above for an example of how CUS populates bays and sectors.	optional
AnkunftsSektorenText (arrival sectors text)	(see VDV Guideline 454 [3]) As for the departure sectors text (`<AbfahrtssteigText>`). Does not apply to the departure stop.	optional
Einsteigeverbot (no boarding):	(see VDV Guideline 454 [3])	optional

Element	Comments	Field
Aussteigeverbot (no alighting):	(see VDV Guideline 454 [3])	optional
Durchfahrt (non-stopping pass)	(see VDV Guideline 454 [3], Section6.1.11 and entry in Section 7 Glossary on extraordinary non-stopping passes).	optional
RichtungsText (direction text)	(See VDV Guideline 454[3] and Section 6.1.17)	optional
VonRichtungsText (from direction text)	(See VDV Guideline 454[3] and Section 6.1.17)	optional
HinweisText (explanatory information)	(see VDV Guideline 454 [3])	optional

5.2.2.4. Composition of the actual journey (IstFormation)

(see VDV Guideline 454 [3])

5.2.2.4.1.   FoFahrzeuge (Rolling stock in the composition)

(see VDV Guideline 454 [3])

5.2.2.4.1.1. Rolling stock equipment (FoFahrzeugAusstattungen)

(see VDV Guideline 454 [3])

5.2.2.4.1.2. 5.2.2.4.1.2. Technical attributes of rolling stock (FoTechnischeAttribute)

(see VDV Guideline 454 [3])

5.2.2.4.2.   Third-party vehicles (FoFremdFahrzeuge) in the composition

(see VDV Guideline 454 [3])

5.2.2.4.3.   Rolling stock groups in the composition (FoFahrzeugGruppen)

(see VDV Guideline 454 [3])

5.2.2.4.3.1. Rolling stock with position in the rolling stock group (FoFahrzeugPositionen)

(see VDV Guideline 454 [3])

5.2.2.4.4.   Segments of the journey for rolling stock groups (FoFahrzeugGruppenFahrtAbschnitte)

(see VDV Guideline 454 [3])

5.2.2.4.4.1. Rolling stock groups with position on the segment of the journey (FoFahrtAbschnitt-FahrzeugGruppen)

(see VDV Guideline 454 [3])

5.2.2.4.4.1.1. Accessible passageway to adjacent rolling stock group (FoDurchgang)

(see VDV Guideline 454 [3])

5.2.2.4.4.2. Direction-of-travel change during a journey (FoFahrtrichtung)
(see VDV Guideline 454 [3])

5.2.2.4.4.2.1. Processing without FoFahrtrichtung being transmitted
(see VDV Guideline 454 [3])

5.2.2.4.4.3. Processing with FoFahrtrichtung being transmitted
(see VDV Guideline 454 [3])

5.2.2.4.5. Journey segments for rolling stock equipment (FoFahrzeugAusstattung-FahrtAbschnitte)
(see VDV Guideline 454 [3])

5.2.2.4.6. Journey segments for rolling stock statuses (FoFahrzeugZustandFahrtAbschnitte)
(see VDV Guideline 454 [3])

5.2.2.4.7. Rolling stock positions on journey segments (FoFahrzeugBelegungFahrtAbschnitte)
(see VDV Guideline 454)

5.2.2.4.7.1. Position of the rolling stock on the segment of the journey (FoFahrzeugBelegung)
(see VDV Guideline 454 [3])

5.2.2.4.7.1.1. Specification of travel groups on the rolling stock (FoReisegruppen)
(see VDV Guideline 454 [3])

5.2.2.4.8. Train composition at the stop (FoHalte)
(see VDV Guideline 454 [3])

5.2.2.4.8.1. Technical description of the arrival at/departure from stop
(see VDV Guideline 454) [3]

5.2.2.4.8.2. Train compositions for the arrival at stop (FoAnkunft)
(see VDV Guideline 454) [3]

5.2.2.4.8.2.1. Rolling stock, statuses and stop positions on arrival at stop (FoFahrzeugeAmHalt)
(see VDV Guideline 454 [3])

5.2.2.4.8.2.1.1. Rolling stock stop position upon arrival at the stop (FoHaltPosition)
(see VDV Guideline 454) [3]

5.2.2.4.8.2.2. Sector designation and positioning upon arrival at stop (FoSektorPositionen)
(see VDV Guideline 454) [3]

5.2.2.4.8.2.2.1. Sector positioning upon arrival at the stop (FoHaltPosition)
(see VDV Guideline 454) [3]

5.2.2.4.8.3.

(see VDV Guideline 454) [3]

5.2.2.4.8.3.1. Rolling stock, statuses and stop positions on arrival at stop at stop <FoFahrzeugAm-Halt>

(see VDV Guideline 454 [3])

5.2.2.4.8.3.1.1. Stop position of a vehicle on departure from stop (FoHaltPosition)

(see VDV Guideline 454) [3]

5.2.2.4.8.3.2. Sector positioning on departure from stop (FoSektorPositionen)

(see VDV Guideline 454) [3]

5.2.2.4.8.3.2.1. Stop position of a vehicle on departure from stop (FoHaltPosition)

(see VDV Guideline 454) [3]

5.2.2.5. Multiple use of element structures within the actual composition (IstFormation)

5.2.2.5.1.   Description of segment (FoAbschnitt)

(see VDV Guideline 454) [3]

5.2.2.5.2.   Description of changes from specification (FoAenderungen)

(see VDV Guideline 454) [3]

5.2.2.5.2.1. Description of change texts (FoAenderungsTexte)

(see VDV Guideline 454) [3]

5.2.2.5.3.   Description of rolling stock status (FoZustand)

(see VDV Guideline 454) [3]

5.2.2.5.4.   Description of structural access points for extensions (FoErweiterung)

(see VDV Guideline 454 [3])

5.2.2.6. Additional Information (StoerungsInfo) (congestion information)

(see VDV Guideline 454 [3])

5.2.2.7. Forecast quality (IstAnkunftPrognoseQualitaet or actual arrival forecast quality and IstAbfahrtprognoseQualitaet or actual departure forecast quality: ZeitQualitaet or time quality))

(see VDV Guideline 454 [3])

5.2.2.8. Reference to the originally scheduled journey: (FahrtBeziehung)

(see VDV Guideline 454 [3])

Implementation note:
All data platforms must receive and forward the new `<FahrtBeziehung>` (journey relation-ship) element. The following applies to all other systems`<FahrtBeziehung>` does not have to be sent or evaluated in the Swiss public transport system. However, if a `<FahrtBezi-ehung>` is received, an XSD validation error must not be triggered.

5.2.3. Traffic-related actual data transmission (IstUmlauf)

(see VDV Guideline 454 [3])

5.3. Secured connection relationships

(see VDV Guideline 454 [3])

<u>Implementation note</u>:
All data platforms must receive and forward the modified `<AnschlussPlan>` (connection plan). The following applies to all other systems: the `<AnschlussPlan>` does not have to be sent or evaluated in the Swiss public transport system. However, if an `<AnschlussPlan>` is received, an XSD validation error must not be triggered.

5.3.1. 5.3.2 Planning data of a connection relationship (AnschlussPlan)

(see VDV Guideline 454 [3])

5.4. Transmission of train composition information

(see VDV Guideline 454 [3])

5.5. Transmission of combined journeys (connection of vehicle journeys)

(see VDV Guideline 454 [3])

6. Handling of AUS actual data service

6.1. Implementation notes and rules

(see VDV Guideline 454 [3])

6.1.1. Forecasting competence of the ITCS

(see VDV Guideline 454 [3])

6.1.2. Additional rule on delay profile

(see VDV Guideline 454 [3])

6.1.3. Aggregation of messages for a journey

(see VDV Guideline 454 [3])

6.1.4. Example "Travelling through a stop" (attribute change)

(see VDV Guideline 454 [3])

6.1.5. Example "Operating a request stop"

(see VDV Guideline 454 [3])

6.1.6. Example "Route changes"

(see VDV Guideline 454 [3])

In the case of a partial cancellation, an `<IstFahrt>` (actual journey) is sent with the following characteristics:

- the `<FaelltAus>` (cancelled) element is not included or has the value `false`.
- the `<Komplettfahrt>` `>` (complete journey) element contains the value `true`.
- all currently valid elements of the `<IstHalt>` (actual stop) types are specified.
- the cancelled elements of the `<IstHalt>` (actual stop) type are not given.

In rail transport, the journey cannot always be divided into two separate journeys in the event of a line closure. Instead, as a temporary solution, the last stop before the route closure is transmitted with `<HinweisText=Teilausfall Abfahrt>` (information text = partial cancellation departure) and the first stop after the route closure is transmitted with `<HinweisText=Teilausfall Ankunft>` (information text = partial cancellation arrival). All stops between these two stops are cancelled.

6.1.7. First message and preview time

(see VDV Guideline 454 [3])

6.1.8. Time-related message behaviour – delays

(see VDV Guideline 454 [3])

For application in the Swiss public transport system, a standard value of 30 seconds has been defined for the delay for all systems. If a subscription contains a different value, the server is nevertheless entitled to process the subscription with a delay of 30 seconds. Usefully, the same approach is taken in VDV454 and VDV453

6.1.9. Element Forecast inaccurate (PrognoseUngenau)

(see VDV Guideline 454 [3])

Implementation note:
The new value of unknown (unbekannt)) in forecast inaccurate (PrognoseUngenau) <u>must be received, evaluated and forwarded.</u>

<u>For further implementation specifications in ÖV Schweiz, see</u> chapters 6.1.18, 6.1.19 and 6.1.20.

6.1.10. Withdrawal of forecasts/resetting the journey

(see VDV Guideline 454 [3])

Note:
The behaviour regarding withdrawing predictions by setting forecast possible = false (`<PrognoseMoeglich=false>`) was changed in VDV Guideline 454 [3], version 2.1. Now only prediction times are reset to the target times; other changes such as route changes, track changes, formation changes, etc. remain. If the entire journey needs to be reset to target, the new reset journey (`<FahrtZuruecksetzen>`) flag must be set to the value `<true>`. Forecast possible = false (`PrognoseMoeglich=false`) in combination with reset journey = true (`<FahrtZuruecksetzen=true>`) corresponds to the previous behaviour.

Note:
Forecast possible (`<PrognoseMoeglich>`) has been removed from REF-AUS.

(see also Section 5.2.2)

6.1.11. Actual arrival and departure times

(see VDV Guideline 454 [3])

Note: Specifying arrival and departure status = real does not provide any information as to whether a vehicle has effectively stopped at a stop or just travelled through. The times are transmitted immediately and independently of the element `<Durchfahrt>` (`Non-stopping pass`). The non-stopping pass (`<Durchfahrt>`) element is only for planning purposes and not used to retroactively report that a train has travelled through a stop.

6.1.12. Journey cancellations

(see VDV Guideline 454 [3])

In REF-AUS, all stops must always be supplied, even if there is no change of route (and especially in the event of trip cancellations).

In AUS, **when scheduled journeys are cancelled completel**y, at least one `<IstFahrt>` (actual journey) must be sent with the following properties:

- the `<FaelltAus>` (cancelled) element has the value `true`.
- the `<Komplettfahrt>` > (complete journey) element contains the value `true`.

All stops from the last complete journey prior to the cancellation message" must be delivered.

In the event of a cancellation, all stops from the "Cancellation message" column must be included.

Erstmeldung (first message)	Komplettfahrt (complete journey	Komplettfahrt (complete journey	Cancellation message (as complete journey)
Stop A	Stop A	Stop A	Stop A
Stop B	Stop B	Stop B	Stop B
Stop C	Stop C	Stop C	Stop C
Stop D	Stop D	Stop D	Stop D
Stop E	Stop E		
Stop F			

The aim is to provide the data recipients with as much information as possible about the cancelled journey. This is especially practical for matching (if no REF-AUS data is available) and for data recipients that do not have a seasonal timetable or other scheduled data available.

`<FahrtStartEnde>` (journey end) must not be altered when a route is changed.

Note:
- The cancellation of a journey that has already started never results in a journey cancellation; instead, it only results in a partial cancellation or a route change.
- For an initial message (as a complete journey), all stops must always be included in the Swiss public transport system, even in the case of a cancellation.

Partial cancellations are route changes and are therefore described in Section 6.1.6.

6.1.13. Additional journeys

In the case of additional actual journeys (AUS service) (e.g. special event trains), the `<Zusatzfahrt>` (additional journey) element from ITCS is set to `true`. Additional journeys are always communicated in the initial message as a complete run (`<Komplett-fahrt> = true`) (complete journey = true).

N.B.:

A special train must not be operated with the same train number as a regular train running on the same day. The combination (operating day, operator/TSP, journey/vehicle or train number) must be unique, i.e. must not occur more than once on operating day X.

Implementation notes for information systems:
All journeys received from an information system via the REF-AUS or AUS data service that cannot be matched to the seasonal timetable are to be considered as additional journeys and must be added as a complete journey regardless of the flag `<Zusatzfahrt=true>` (additional journey = true). Setting the flag provides clarity. It should be set by the data producer whenever possible.

Note:
CUS sees the 'additional journey' flag as a professional courtesy and not as technical information. A journey supplied with the `<Zusatzfahrt=true>` flag may well occur in the planned timetable and must be matched in any case.

6.1.14. Implementation for rail applications

(see VDV Guideline 454 [3])

6.1.15. Obtaining sensible forecasts

 (see VDV Guideline 454 [3])

No matter what the type of vehicle, only the customer-relevant part of a vehicle's journey is transmitted via the VDV interface. Sections relating to service journeys are removed from the journey before sending. In the event of an indefinite delay or composition changes, it may not always be possible to uphold this rule with rail traffic.

6.1.16. Special features of associated trains *(addition in VDV-RV 454)*

(see VDV Guideline 454 [3])

In the case of cross-border travel, SBB combines partial journeys having the same train number and connects the individual partial runs to form a single vehicle journey. This procedure means that the MoT journeys in the seasonal timetable differ from the vehicle journeys in the actual messages.

6.1.17. Special features of feeder trains (*addition in VDV-RV 454*)

(see VDV Guideline 454 [3])

Both splitting (where one train is split into two trains) and combining (where two trains are coupled into one) are feeder trains. As of XSD2017, feeder journeys are linked by journey relationships (`<FahrtBeziehung>`) and are therefore clearly recognisable as such.

Implementation notes for information systems:
Elements such as `<RichtungsText>` (direction text), `<VonRichtungsText>` (from direction text) and `<FahrtStartEnde>` (journey start end) are based on specific vehicle journeys, which is why their values for feeder journeys, without specification and interpretation by the information system of the associated `<FahrtBeziehungen>` (journey relationship), are not suitable for publication to customers.

6.1.18. Undetermined delay (addition in VDV RV 454)

**Transmission of an " undetermined delay" in VDV454**
According to VDV Guideline 454 [3] an "indefinite delay" must be transmitted as follows:

Value in PrognoseUngenau	Value in Prognose-Qualität	Recommendations for presentation to customers
This attribute should not be transmitted	5	• The attribute is not valid for the whole trip, but only for the corresponding arrivals and departures. • Instead of the transmitted delay, the customer should be shown a note such as "undetermined delay". • Important: The display should convey to the customer that the displayed connection is uncertain and that he should look for alternatives.

Business definition of "undetermined delay"

In **Swiss** rail traffic, "**undetermined delay**" refers to the condition in which it is not possible to predict when the vehicle will continue or arrive at or depart from a future stop. As a rule, this is a disposition decision.

In the following example, the route between stops 3 and 4 is interrupted, for example by a landslide. At present, it is not yet clear when the obstacle can be removed.

" "Normal" forecast calculation   "Undetermined delay"
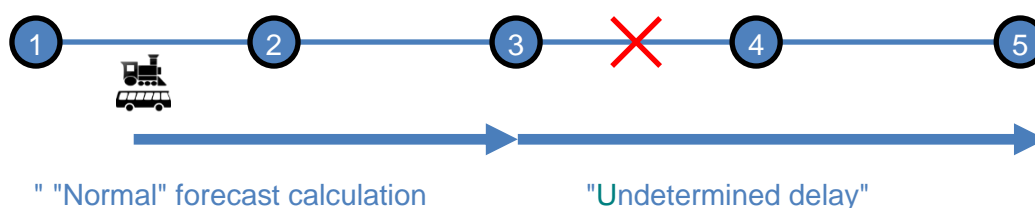
The train is located between stops 1 and 2 and can still continue to stop 3.
The interface should now be used to transport the train to stops 1 and 2 as predicted, and stop 3 can still be reached as predicted. From the departure time at stop 3, the "undetermined delay" exists.

Possible causes for an "Undetermined delay":
• A train has a technical problem at a station that cannot be scheduled.
• A train has a technical problem on the line that cannot be scheduled.
• A non-terminable infrastructure problem (e.g. rail breakage, overhead line malfunction, etc.) with complete track disruption.
• Natural phenomena (e.g. landslide) with complete interruption of the line.
• An ambulant person in the vehicle must be picked up by an ambulance.
• etc.

The only thing that is certain about an "undetermined delay" is that the ITCS (or the dispatcher) does not know when the vehicle will continue or arrive at or depart from a future stop. Therefore, until further notice, no forecast time can be determined, at most it can be roughly esti-

mated. In this case, instead of the arrival and departure forecasts (or a time delay), the passenger is shown an "undetermined delay". This term is known to the passengers. Based on this information, they decide for themselves whether there is a safer connection to their destination for their needs.

The following should be noted:
1. an "indefinite delay" tells the passenger that this part of the trip is uncertain and that he or she may be directed to another trip later.
2. connections for arrivals or departures with an "undetermined delay" cannot be calculated based on real-time data due to the lack of forecast times. If these are to be displayed to the passenger, a rough estimate is used as a basis and the connection must be marked accordingly. In many cases, an alternative is displayed.
3. if the vehicle is at a stop, it can happen that the vehicle arrives on time at this stop and the connection can still be reached, while the departure is uncertain due to an event and an "undetermined delay" is displayed for this.
4. an "indefinite delay" can also start a few stops later than the vehicle is now. In this case, the journey must continue to be supplied with real-time data as usual up to the point where the "undetermined delay" begins.
5. the information in the journey planners must be consistent with that at the station.
6. many journeys with an "undetermined delay" end in a breakdown. However, unlike an outage, a trip with an undetermined delay can be reactivated via a new dispatching and then flows back into the routing and connection assurance.
7. the operator wants to transport passengers away from the trips with "undetermined delay", not to them.

6.1.19. Vehicle in traffic (addition in VDV RV 454)

Transmission of "Vehicle in traffic jam" in VDV 454
According to VDV Guideline 454 [3], "Vehicle in traffic jam" can be transmitted as follows:

Value in PrognoseUngenau	Value in PrognoseQualität	Recommendations for presentation to customers
"Vehicle in traffic jam"	This attribute is not transmitted	• Traffic jam will be published on DFI-Display. • Notice such as "Vehicle is in traffic jam - expect further delays" in the output channels. • Important: The presentation should convey to the customer that the vehicle will probably arrive later than forecast but will not fail.

Business notes for "Vehicle in traffic jam"
Basically, "vehicle in congestion" is a locating condition of the vehicles monitored by the control system. The idea behind this is that no reliable forecasts can be made during this time, as the normal flow of travel is disrupted. The state is set as soon as the vehicle.

(a) Is located between two stops.
(b) For a certain time (e.g. 20 seconds)
(c) Slower than a certain speed (e.g. 5 km/h)

is on the road. The locating state "Vehicle in traffic jam" is therefore not set as long as the vehicle is in the area of a stop.

The traffic jam message is also often transmitted in case of unclean data supply or driving style, i.e. in case of location problems: The driver is already with his vehicle on the stop (usually final stop) and waits. According to the vehicle location, however, the vehicle has not yet arrived. Then the vehicle also gets into a traffic jam. At least the congestion message is not updated to the next trip.

Or the driver waits at the start stop for departure. Now something happens and he pulls ahead with the bus. If the stopping area is too small, the departure is determined by the on-board computer. However, since the driver is not yet driving off "properly", but is waiting, the traffic jam message is transmitted.

Representation on the DFI displays.
In many control systems, the location status "vehicle in traffic jam" is either not configured or it is not output to the customer. In the ZVV, on the other hand, this function is used throughout and is indicated on the DFI displays by a ">" sign.
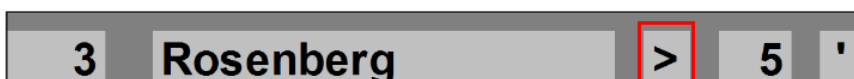
Whether all customers understand this sign is not entirely clear.

6.1.20.   Missing update (Erweiterung RV)

According to VDV Guideline 454 [3], "Missing update" can be transmitted as follows, "Missing update" can be transmitted as follows.

Value in PrognoseUngenau	Value in Progno-seQualität	Recommendations for presentation to customers
"Missing update"	This attribute is not transmitted	No representation to the customers

With PrognoseUngenau = "missing update" forecast times are displayed, but no longer up-dated. If no update is possible for a longer time, PrognoseMoeglich=false shall be transmitted.

6.2.   Connection information

(see VDV Guideline 454 [3])

7. Glossary

(see VDV Guideline 454 [3])

Specialist terms used in this document:

Term	Meaning
Extraordinary non-stopping pass (Ausserordentliche Durchfahrt)	An extraordinary non-stopping pass is when, as a result of a planning change, a stop is not used even though it has been transmitted as part of the planning data or in a previous message (AUS, REF-AUS).
(CUS) VDV v2017c	The internal CUS designation for the VDV interfaces based on the VDV specification and schema version XSD2017. **N.B.:** This is normally referred to as XSD2017 in the Swiss public transport system. The designation used by CUS and also in this document takes into account that an implementation must also consider special characteristics, ID specifications and use cases of the Swiss public transport implementation rules, which are not part of the VDV XSD schema.
Real-time data	In the ITCS Central, short-term timetable forecasts are calculated or assignment measures are defined that are effective in the short term. This term describes actual data from the processes that are transmitted via the VDV454 AUS data service.
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 seasonal timetable is not available via VDV interfaces.
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.
Working timetable data	Working timetable data refers to all scheduled timetable data (e.g. daily and seasonal scheduled timetable data)
Data subscribers	This document refers 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 to not produce any data!
GO-Nr.	Business organisation number: DIDOK2.0 [5] 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) 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.

8. English alias designation

(see VDV Guideline 454 [3])

9. Appendix: Transmission of forecast quality

(see VDV Guideline 454 [3])

For further implementation specifications in ÖV Schweiz, see chapters 6.1.18, 6.1.19 and 6.1.20.

10.   Appendix: Value lists (ENUM)

(see VDV Guideline 454 [3] with the exception of the following sections).

10.1. FoFahrzeugTyp (rolling stock type)

(see VDV Guideline 454 [3])

10.2. Rolling stock equipment code (FoFahrzeugAusstattungsCode)

(see VDV Guideline 454 [3])

10.3. Rolling stock language code

(see VDV Guideline 454 [3])

10.4. Rolling stock technical attributes code

(see VDV Guideline 454 [3])

10.5. Composition change code at stop

(see VDV Guideline 454 [3])

Implementation note:
Data platforms must receive and forward the new values `<FehlendeRollstuhlplaetze>` (no wheelchair facilities) and `<FehlendeNiederflurwagen>` (no low floor coach). The following applies to all other systems: the new values `<FehlendeRollstuhlplaetze>` (no wheelchair facilities) and `<FehlendeNiederflurwagen>` (no low floor coach) must only be sent, received and evaluated in connection with the formations. If the new values are received, an XSD validation error must not be triggered.

10.6. Rolling stock status code

(see VDV Guideline 454 [3])

10.7. Orientation of rolling stock

(see VDV Guideline 454 [3])

10.8. Direction of travel

(see VDV Guideline 454 [3])

10.9. Product ID

See Section 3.3.

10.10. Vehicle text

See Section 3.3.

10.11. Service attribute (addition in VDV-RV 454)

Attributes and explanatory notes (see [6], Section 9) are transmitted via `<ServiceAttribute>`. The following values are defined in the Swiss public transport system:

Name of the service attribute	Meaning	Remarks
NF	Low floor	Phase 1, for date, see list of implementation deadlines
PH	No low floor	Phase 1, for date, see list of implementation deadlines
(… to be defined by INFO+)	Autonomous and spontaneous access for manual and electric wheelchairs.	Phase 2, for date, see list of implementation deadlines
(… to be defined by INFO+)	Access for manual and electric wheel-chairs with advance notice	Phase 2, for date, see list of implementation deadlines
(… to be defined by INFO+)	Limited access for manual and electric wheel-chairs.	Phase 2, for date, see list of implementation deadlines
(… to be defined by INFO+)	Limited access for manual and electric wheel-chairs.	Phase 2, for date, see list of implementation deadlines
Z	Supplement payable	Phase 2, for date, see list of implementation deadlines
TX	Taxi	Phase 2, for date, see list of implementation deadlines
TT	Tilting technology	Phase 2, for date, see list of implementation deadlines

Clarification: Service attributes NF and PH are independent; in other words, "NF = no" does not automatically mean a high floor.

Service attribute value	Meaning	Remarks
NF = true	Low floor	
NF = false	Not low floor	Uneven high floor
NF missing	No information on low floor	Uneven high floor
PH = true	High floor	
PH = false	Not high floor	Uneven low floor
PH missing	No information on high floor	Uneven low floor

11. Appendix: XML examples

(see VDV Guideline 454 [3])