Interface specification for Roadside Components

System overview

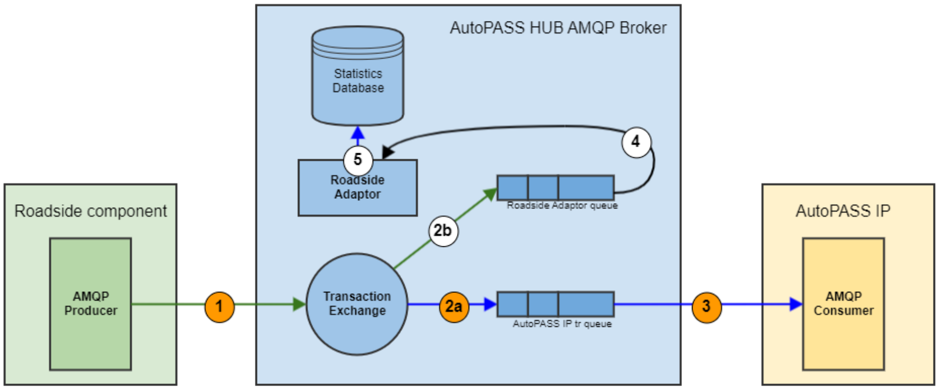
The system described in this document shall collect roadside passages from Roadside Components and distribute status files to Roadside Components.

The Roadside Component (concentrator or charging point) shall integrate with the AutoPASS HUB via the AMQP protocol and the File REST protocol:

1. The roadside component shall send individual transactions (each containing data for one single passage) to the AutoPASS HUB via AMQP
2. The roadside component shall receive status files from AutoPASS IP via the AutoPASS HUB as follows:
    a. Consuming an AMQP message that contains a download URI for the file
    b. Sending a request to the HUB File REST API to download the actual file

The procedures are described in more detail in the following sections.

Sending transactions to the AutoPASS HUB

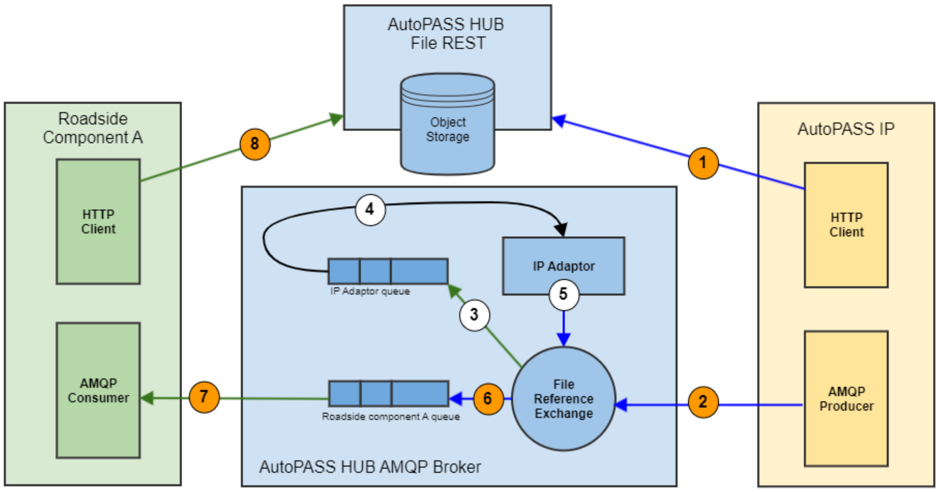


The figure illustrates how the Roadside Component (to the left) and AutoPASS IP (to the right) integrate with the AutoPASS HUB (in the middle) and shows a typical, successful scenario where the Roadside Component sends transaction data to AutoPASS IP.

The steps are as follows (note that the white numbered circles indicate HUB internal data flow):

1. The Roadside component sends an AMQP message containing data for one single transaction to the Transaction Exchange
2. The broker publishes the message to:
    a. the AutoPASS IP tr queue because AutoPASS IP subscribes to transactions from the Roadside Components
    b. the Roadside Adaptor queue because the Roadside Adaptor subscribes to transactions from the Roadside Components
3. AutoPASS IP receives the transaction and may start identification and pricing.
4. The Roadside Adaptor receives the transaction
5. The Roadside Adaptor extracts and transforms data from the transaction and loads data into the Statistics Database

Receiving status files from AutoPASS IP



The figure illustrates how the Roadside Component and AutoPASS IP integrate with the AutoPASS HUB and shows a typical, successful scenario where Roadside Component A receives a status file from AutoPASS IP.

The steps are as follows (note that the white numbered circles indicate HUB internal data flow):

1. AutoPASS IP is about to send a status file via AutoPASS HUB and starts this process by uploading the file via the AutoPASS HUB File REST API. The File REST API returns a URI that can be used to download the file.
2. AutoPASS IP does not need to resolve the recipient and simply creates an AMQP message containing the download URI and sends this message to the File Reference Exchange.
3. The IP Adaptor subscribes to all messages from AutoPASS IP, and the broker publishes the message to the IP Adaptor's queue.
4. The IP Adaptor receives the AMQP message and downloads and validates the file (details not shown here).
5. The IP Adaptor sends a new AMQP message containing the same URI to the File Reference Exchange. The Adaptor has now resolved the recipient (typically based on the filename) and uses a routing key that identifies the recipient(s).
6. The File Reference Exchange publishes the message to Roadside Component A's queue (a message might also be delivered to more than one queue).
7. The Roadside Component A has bound to Component A queue and receives the AMQP message containing the download URI.
8. The Roadside Component downloads the file from the File REST API

Interface specification

Transaction message

Each passage shall be sent to the AutoPASS HUB within one single AMQP transaction message. The passage data shall be enclosed as the AMQP payload in JSON format. Parameter values shall be inserted according to 4.3 AutoPASS Data Formats.pdf, Appendix A8.

The Roadside Component shall assign a unique transaction ID to each transaction, as a GUID value.

Following is a sample JSON payload (incomplete):

Sample transaction

```
{
   "transactionId":"1ccbf1cd-5c82-44be-8426-1675819e4688",
   "chargingPoint":"055",
   "direction":"1",
   "lane":"01",
   "time":"20210101123030256",
   ...
   "ocrConfResultFrontAndRear":"100",
   "ocrGroupResultFrontAndRear":"1"
}
```

Status files

Refer to 4.3 AutoPASS Data Formats.pdf

System requirements

AMQP Protocol version

The Roadside AMQP client shall support AMQP version 0-9-1.

> **Notes on AMQP versions**
>
> AMQP version 1.0 (the latest version) and AMQP version 0-9-1 are two completely independent versions of Advanced Message Queuing Protocols. Version 1.0 was developed by the OASIS group. However, the slightly older version 0-9-1 is often used. They are not compatible with each other. Version 1.0 differs primarily by the reduced importance of brokers, bindings and exchanges.
>
> RabbitMQ is a well known and widely deployed open source message broker and has been chosen as the message broker for AutoPASS HUB. RabbitMQ has been developed to support AMQP version 0-9-1 and its support for AMQP version 1.0 is only offered via a plugin (experimental).

AMQP client implementation guidelines

Refer to HUB client implementation guidelines#Producerimplementationrequirements