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Definition of Service NERE Subscription

Summary

This service is common for all of the services constituting the NERERuntimeagent. When information is changed in the different services there is a need to inform subscribers to the changes, this SD describes how the subscription can work.

Sammanfattning

Denna tjänstebeskrivning är gemensam för alla tjänster som bildar NERERuntimeagent. När information ändras i dessa olika tjänster finns ett behov av att informera abonnenter på dessa förändringar. Denna SD beskriver hur detta abonnentförfarande går till.

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1 General

1.1 Background

The information available in the NERE runtime agent will change and depending on what information that has been changed different subscribers can be interested. This service describes how consumers and producers can be notified of different changes in the NERE Runtime agent.

1.2 Scope

This service is common for all services in NERE Runtime agent, se ref[2]. When information is changed in the NERE Runtime agent and its services the changed information can be published through this mechanism. Different patterns for subscription is listed in ref[1]. This service is a combination of two main patterns in this report and can be combined with different underlying middleware or used standalone. One problem with subscription patterns is that some middleware requires a server component in the subscribing hosts to be able to receive notifications. The server handling the subscription also need separate functionality to handle all subscriptions. When many nodes need (subscribe) the same information the network will be flooded with a lot of information, with a scalability problem as result.

In message oriented topic based middleware the subscription is the way return codes are passed and is therefore very useful in a situation like this. This SD describe how a lightweight interface can be designed using IP-multicast to support the need for an open protocol for this purpose.

1.3 References

- | | |
|---|---------------|
| [1] Sys POC recommended subscription handling in Service interfaces | LT1K P06-0506 |
| [2] NERE DTA | LT1K P05-0557 |
| [3] Requirements tracing, Components requirement to/from Design | LT1K P06-0607 |

1.4 Definitions and abbreviations

NERE	Network enabling runtime environment
TTL	Time to live
TSN	Technical system node

2 Specification

2.1 Context

2.2 Overview diagram

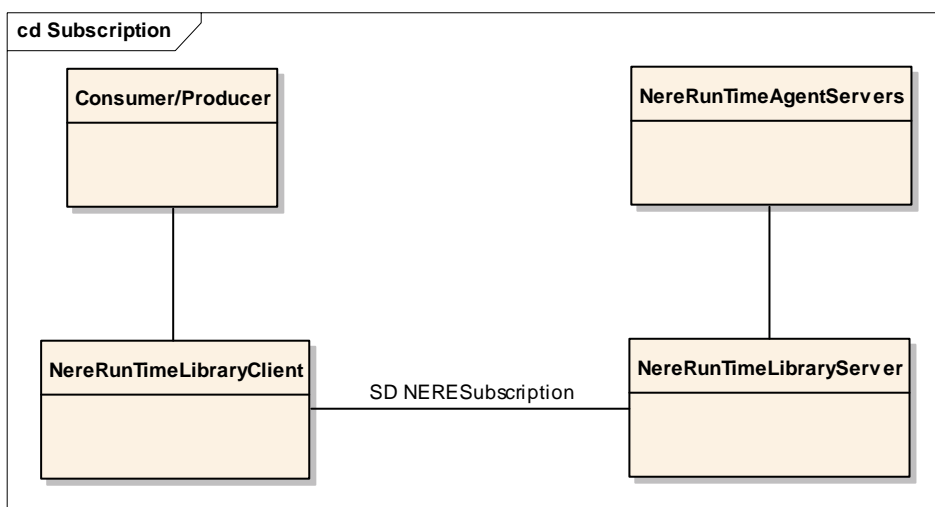


Figure 1 Overview diagram

The diagram shows that the consumer /producer use a NereRunTimeLibraryClient to subscribe to events. How the information is passed on the net is described in this SD. On the server side a common library (NereRunTimeLibraryServer) can be used so that the different services just can publish the events. The mechanisms that can be realized by this SD have different reliability depending on the used transport layer.

2.3 External requirements

See Requirements tracing, Components requirement to/from Design ref [3].

2.4 Use case model

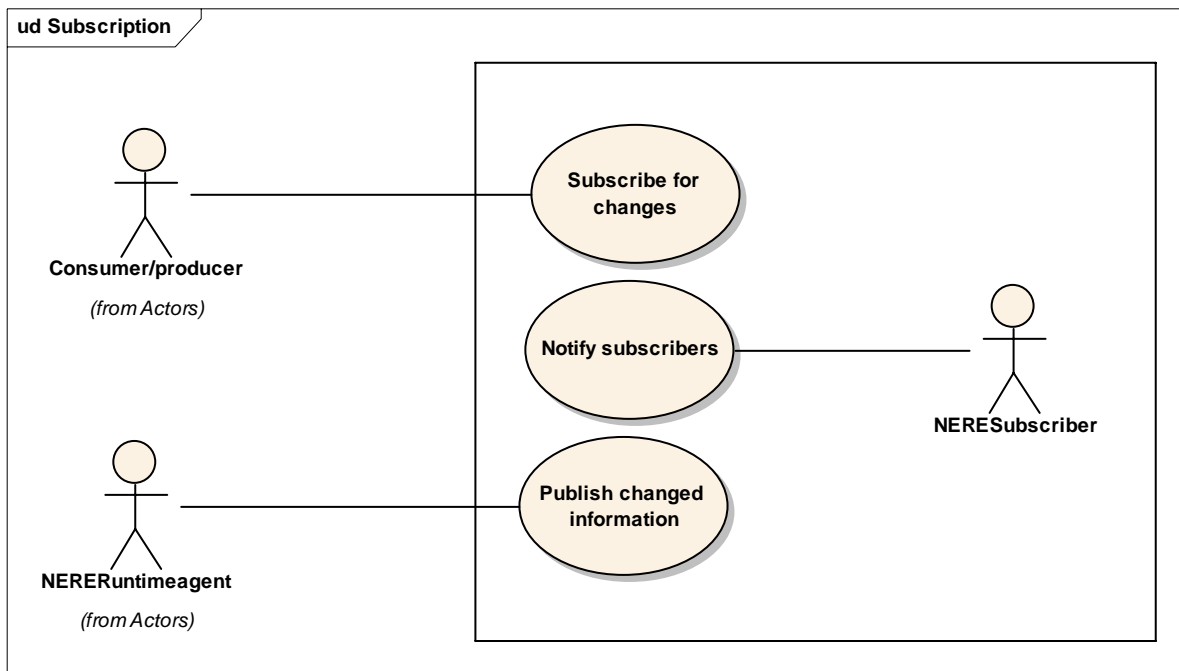


Figure 2 Use case diagram

The required functionality can be illustrated by the use case diagram above:

- Any consumer or producer subscribes for changes and will get notified as soon as any changes arrive to the subscriber mechanism. A simple filter can be included in the client library that sort out the subscribed events to the correct consumer (see figure 3).
- The NERE Runtime agent just publishes the changed information without any knowledge of what subscribers need or which subscriber that are interested in what information.

The use case can be achieved by using the libraries in figure 1. The detailed API of the libraries is not described in this SD. The use case together with the sequence diagram in figure 3 describes the intended functionality, this SD describes however the messages passed on the network.

2.5 Internal Requirements

See Requirements tracing, Components requirement to/from Design ref [3].

The mechanism in this SD must be able to implement without any dependency to a middleware in the consumer side.

2.6 Service/Interface Action

2.6.1 Sequence diagram

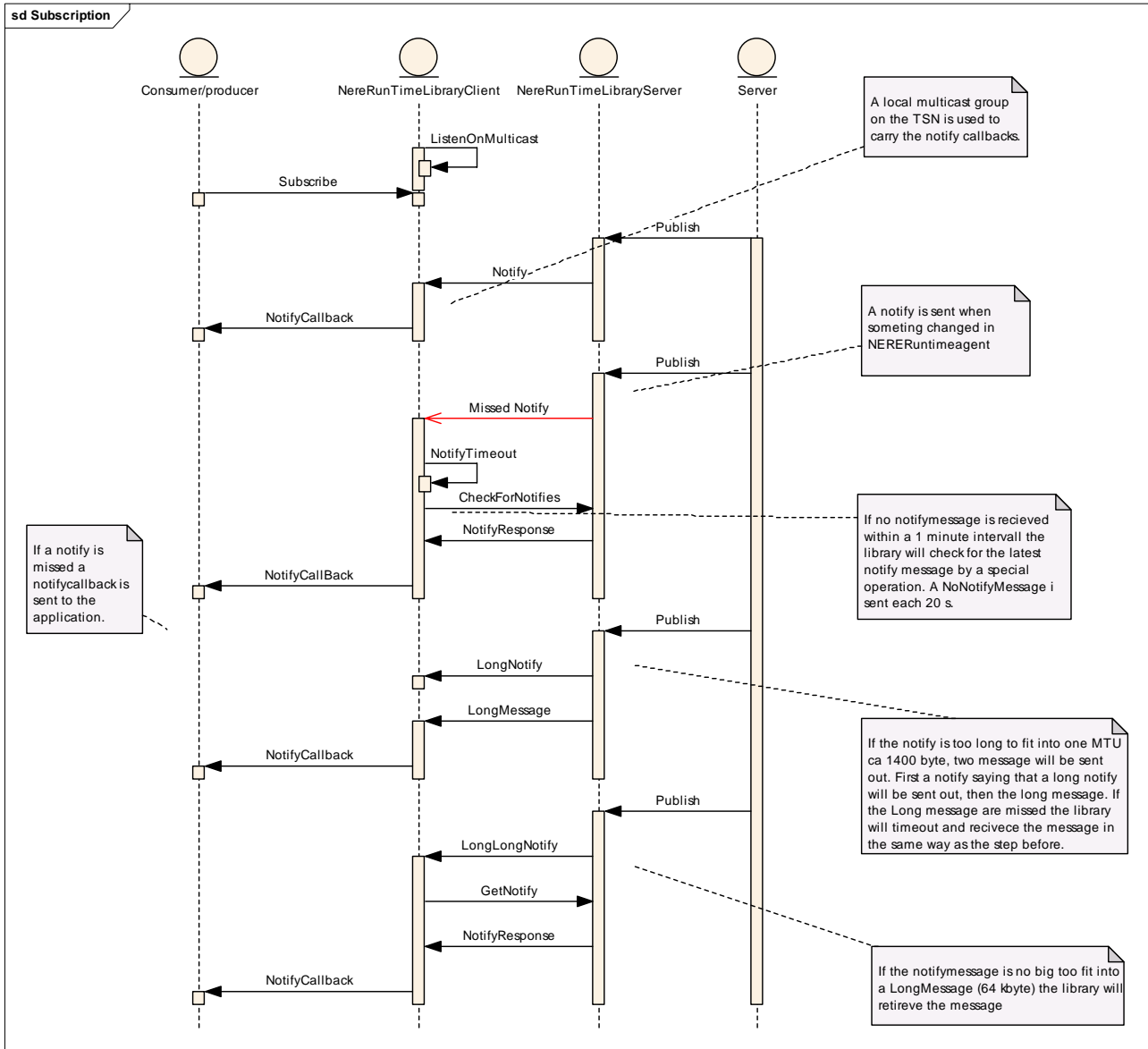


Figure 3, sequence diagram for subscription

The sequence diagram above illustrates the main flow of information between the different entities. Note that this diagram describes the information passed on the net in particular, other messages must be added to describe the detailed interaction between the libraries and respectively consumer/producer and server.



2.6.2 Generic Network Protocol

2.6.2.1 Operations NereRunTimeLibraryClient

GetAllLatestNotify

In: Sequence number

Out: notifies

Faults:

- Obsolete, meaning that the number is too old.
- NO_later meaning that there are no later notifies than the supplied sequence number.

Description: Will return all notifies with a higher number than the supplied sequence-number.

GetNotify

In: Sequence number

Out: notify

Faults:

- Obsolete, meaning that the number is too old.

Description: Will return a notifying with the requested sequence number.

2.6.2.2 Operations NereRunTimeLibraryServer

Notify

In: Notify

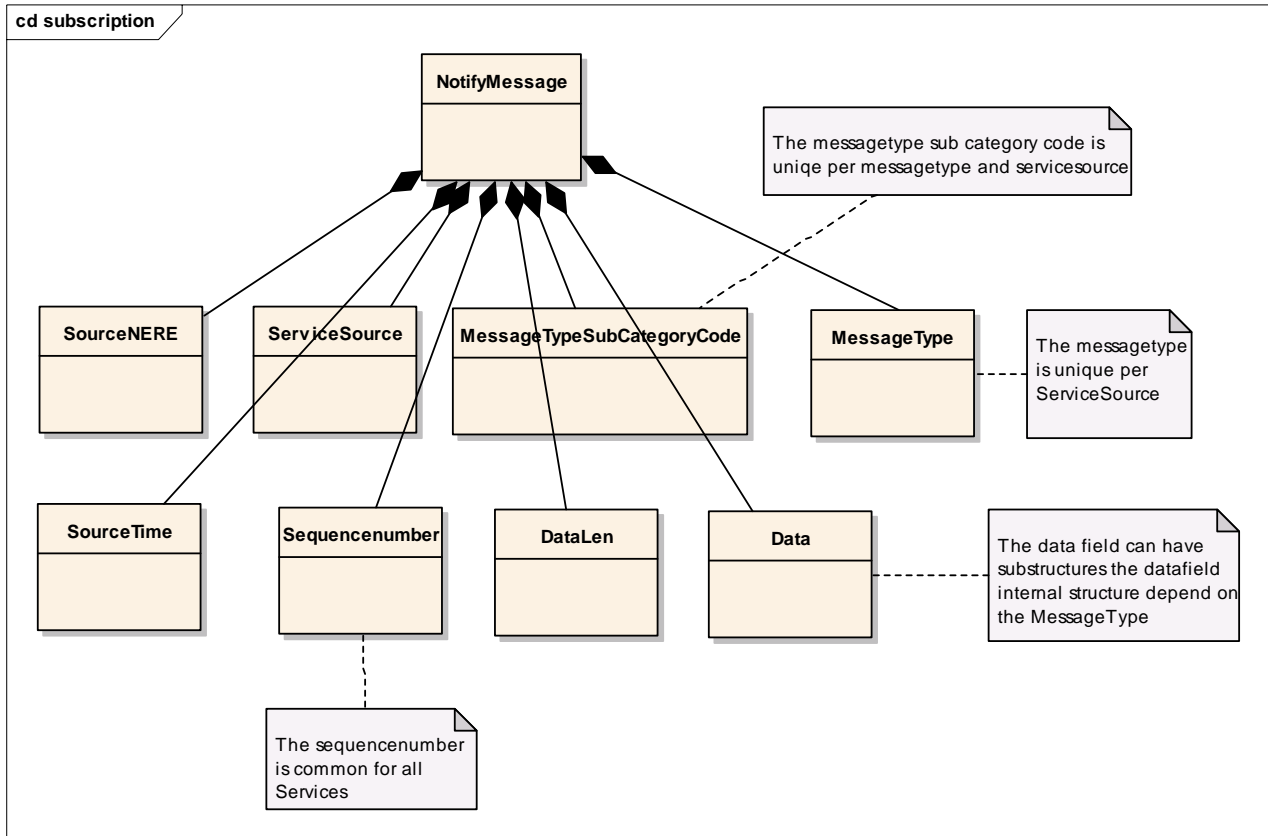
Out: -

Faults:

Description: Will send a notify message. If the notify message data field is bigger than 1400 byte the Notify will be send with the data field set to 0 and then to the actual length according to the sequence diagram. If the data field is bigger than 64000 byte the data field will be set to 0 before it is sent out, se sequence diagram.

2.6.3 Data model

An notify message consist of the attributes illustrated in picture 4



Picture 4, notify content

2.6.4 Interface implementations

The operations that the NereRunTimeLibraryClient does, can be developed based on any middleware, i.e. webservice over HTTP. The operations in NereRunTimeLibraryServer are recommended to be based on UDP over a local multicast group that only works within the local TSN.

2.6.5 Security considerations

The used multicast group must be local so that all instances can use the same group. The used TTL value for notify messages must be set to 1 so that they do not propagate through the nearest router. This will lead to a timeout in nodes subscribing from other TSN:s (see sequence diagram). In order to handle retransmission attacks the messages have a sequence number and a source time stamp. In addition to this a signature can be added if needed, but it will lead to higher CPU load.



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