# Solution Architecture Example: Nouveau Health Care
# Claim Payment Solution Architecture

This document presents an example Solution Architecture document. For brevity, some sections are intentionally left incomplete

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# 1 Business Objectives and Constraints

Nouveau Health Care is a traditional health care insurance company. It sells health care insurance policies and covers claim payments with the revenue it collects from its premiums. It also administers the processing of claims.

There are some additional factors that add to the complexity of Nouveau's business. In some cases, the employers who provide the health care benefits for their employees also provide the funds for paying the claims: Nouveau administers the policies. In other cases the administration of specialized services (vision and dental care) is farmed out to other companies.

## 1.1 Quantified Business Expectations

For business reasons, Nouveau Health Care needs to be able to engage business partners specializing in claim payment processing for particular kinds of health care (e.g. vision, pharmaceuticals). The objective is to standardize the means by which Nouveau interacts with these business partners and implement a claim payment architecture based on that standard. In the first release, interactions with VisionCare (a business partner) will be implemented to allow them to process Nouveau's vision claims.

## 1.2 Business Constraints

It is expected that this project will take 18 months and involve a team of 25 full-time-equivalent Nouveau personnel over that time period, with a budget of $6million. VisionCare resources are not included in this budget, although they are committed to completing their side of the project in this time frame.

## 1.3 Business Risks

A failure in the processing of a single claim results in the need for manual intervention in the processing of the claim. This results in a 100x increase in the cost of processing a claim. Since there is only a 5% profit in the automated processing of a claim, a single manual process eliminates the profit from 2,000 automated processes. As a result, the overall failure rate of the automated process should be maintained at less than one in 100,000 claims.

Nouveau Health Care processes 4.4 million claims a day. The cost of processing an electronic claim submission is $.85, while the cost of processing a paper claim is $1.85. The impact of the electronic process being unavailable is that the claim is likely to be submitted as a paper claim, with a resulting cost increase of $1.00 per claim. Since claims arrive during peak periods at a rate of 550,000 per hour, the cost of a system outage is $550,000 per hour. Consequently, the availability of the automated business process should be maintained at 99.995% with a maximum outage time of 5 minutes per incident. This allows a maximum of 5 outages/year, with anticipated annual outage costs totaling $230,000 per year. Reasonable investments that can further reduce this anticipated annual outage cost, and have a reasonable payback period, are desirable.

# 2 Solution Context

Nouveau Health Care is part of a larger environment that includes the health care service providers that submit claims and the partner companies that process some of the claims (Figure 2-1). Here we see that there can be more than one claim processor, which explains the need for the Claim Router.
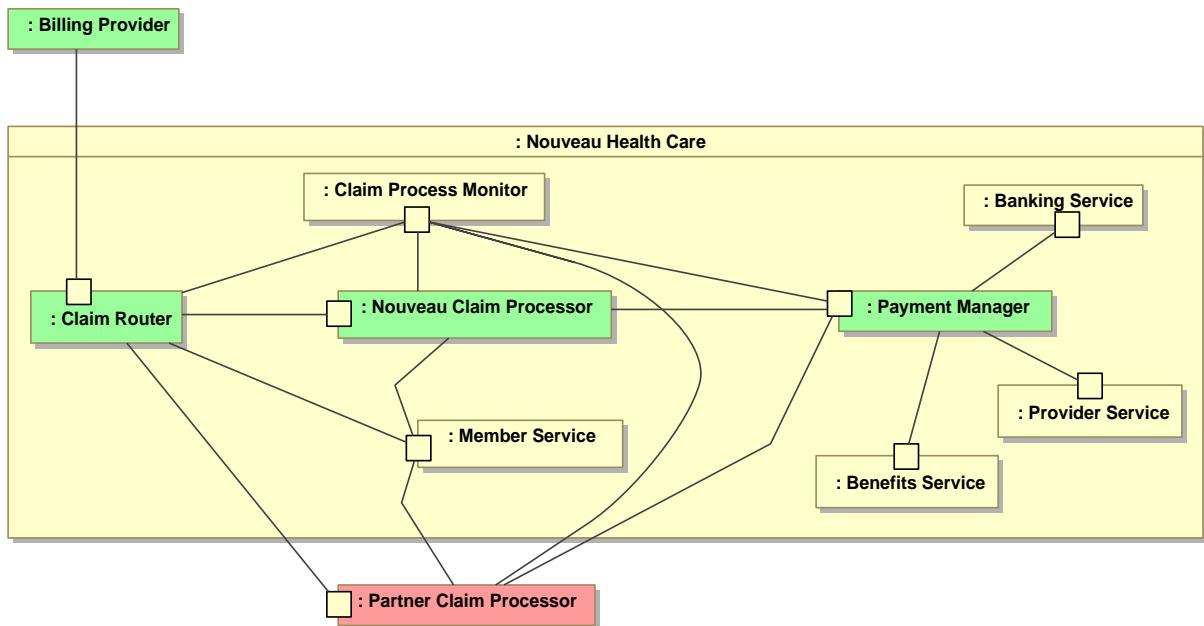
**Figure 2-1**
*Nouveau Health Care in Context*

# 3 Business Process Inventory

This solution focuses on four business processes (Figure 3-1):

[lb]     Validate Membership and its underlying Validate Membership Service

[lb]     Manage Payments, which manages claim payments to health care service providers.

[lb]     Process Claim, and its initiator, Route Claim, which together handle the processing of insurance claims.

[lb]     Monitor Claim Processing, a process that monitors the execution of claim processing.
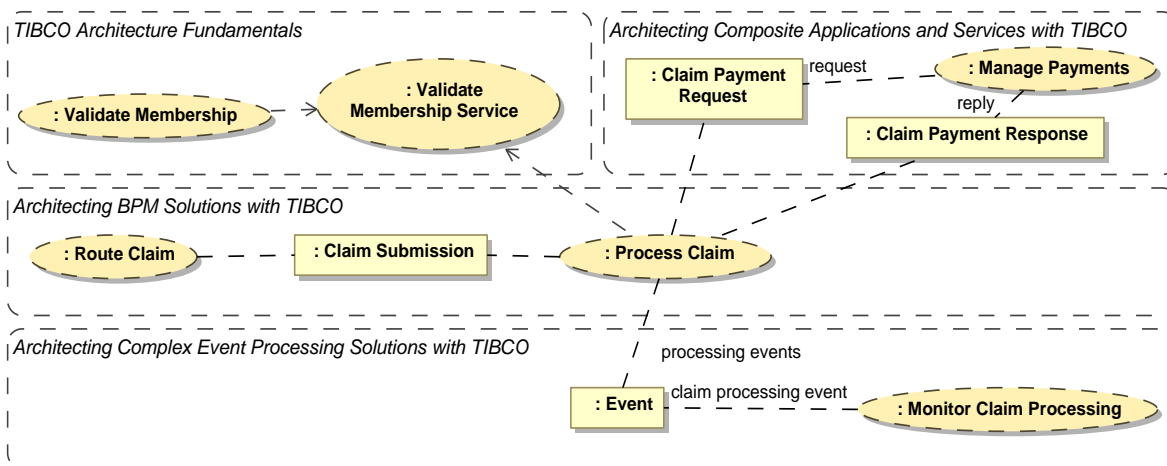


**Figure 3-1**
*Nouveau Health Care Business Processes*

The Validate Membership process is used by authorized parties (health care providers, employers, and members) to validate whether or not an individual was covered by the policy on a given date. This business process utilizes an underlying Validate Membership Service, which is also used by the Process Claim business process.

The Manage Payments process manages the payments to health care service providers resulting from health care claims.[1] What makes this process interesting is that, under normal circumstances, payments are made on a periodic basis (e.g. monthly) to health care service providers. This means that the payment manager must keep track of pending payments. By exception, payments to health care service providers for specific claims may be made immediately.

Process Claim and its related Route Claim process actually handle the processing of health care claims. Routing is required because some claims are processed by Nouveau itself while others are processed by partner companies. Process Claim is a consumer of both the Validate Membership Service and the services of the Payment Manager.

Monitor Claim Processing keeps track of the progress of claim processing. The reason that this is necessary is that some claim processing is done by partner companies. Monitoring provides uniform tracking of all health care claims regardless of whether Nouveau or one of its partners is handling the claim.

# 4  Domain Model

## 4.1  Accounts and Funds Transfers

There are three types of bank accounts involved in the claims payment process: Payer Accounts, Provider Accounts, and Settlement Accounts. Each insurance policy has an associated Payer Account from which claims against the policy are paid. Each health care service provider being paid through funds transfers has a Provider Account. The Settlement Account is used as an intermediary account. When the Payment Manager is told to pay a claim, funds are moved immediately into the settlement account, regardless of when the provider is paid. Funds for providers are taken from this account. In the event that the provider is paid by check, the check is drawn on the Settlement Account.

For audit reasons, it is necessary to keep track of the movement of funds between accounts. A Funds Transfer Record (Figure 4-1) is created for each transfer. Each record keeps track of the amount transferred, the source and destination accounts, the status of the transfer, and the timing of the transfer.

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[1] In the real world, the Manage Payments process would also manage payments to members, reimbursing them for claim-related expenses that they have already paid themselves.
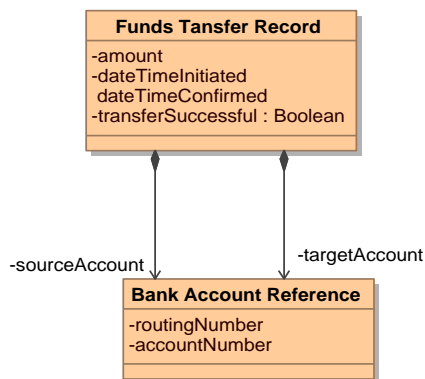
**Figure 4-1**
*Funds Transfer Record*

Each Funds Transfer Record makes a copy of the account reference information at the time the funds transfer is initiated so that subsequent changes to the account information do not affect the record of past transfers.

## 4.2 Settlement Accounts

Each payment involves two Funds Transfer Records: the first captures the movement of funds from the payer account associated with the health care plan to a settlement account; the second captures the movement of funds from the settlement account to the provider account.

By business rule, when the payment manager is told to pay a claim, the related funds are immediately moved from the payer account to the settlement account. The funds remain in the settlement account until the provider is actually paid.

## 4.3 Settlement Concepts

The concepts associated with settling a health care claim are shown in Figure 4-2. Each health care claim has a set of health care service instances, each one of which (if accepted) will eventually be associated with a provider settlement. When the Payment Manager is told to pay a claim, it associates the service instance with a Provider Settlement Record, transfers the associated funds to the settlement account, and records the service instance payment in the form of a funds transfer. This records the movement of funds from the individual health care plan to the settlement account. When the health care service provider is actually paid (which may be either immediate or deferred), a Settlement Payment is made. The payment may occur via a direct funds transfer or it may occur via check and be recorded by a Check Record.
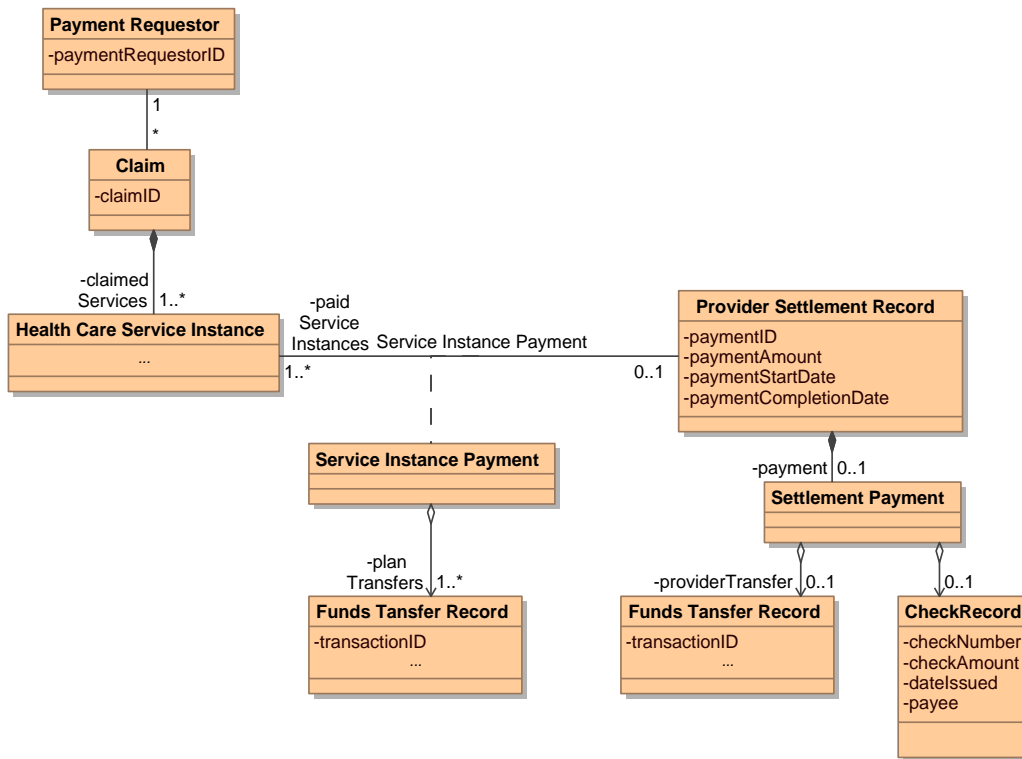
**Figure 4-2**
*Settlement Concepts*

## 4.4 Payment Domain Concepts

Putting it all together, we have a partial model of the payment domain concepts shown in Figure 4-3. This model indicates which services serve as systems of record for the various concepts. The issuer is the entity that sells the health care plan. The Benefits Service manages the benefits plan and keeps track of who is paying for services under the plan and what account these payments are taken from. The Provider service keeps track of health care service providers and the means by which they are to be paid. The Claim Service manages information about the health care claims, and the Payment Manager is responsible for managing the payments to service providers.[2]

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[2] In the real world, the payment manager would also manage reimbursements to plan members who paid for services out of their own pocket.
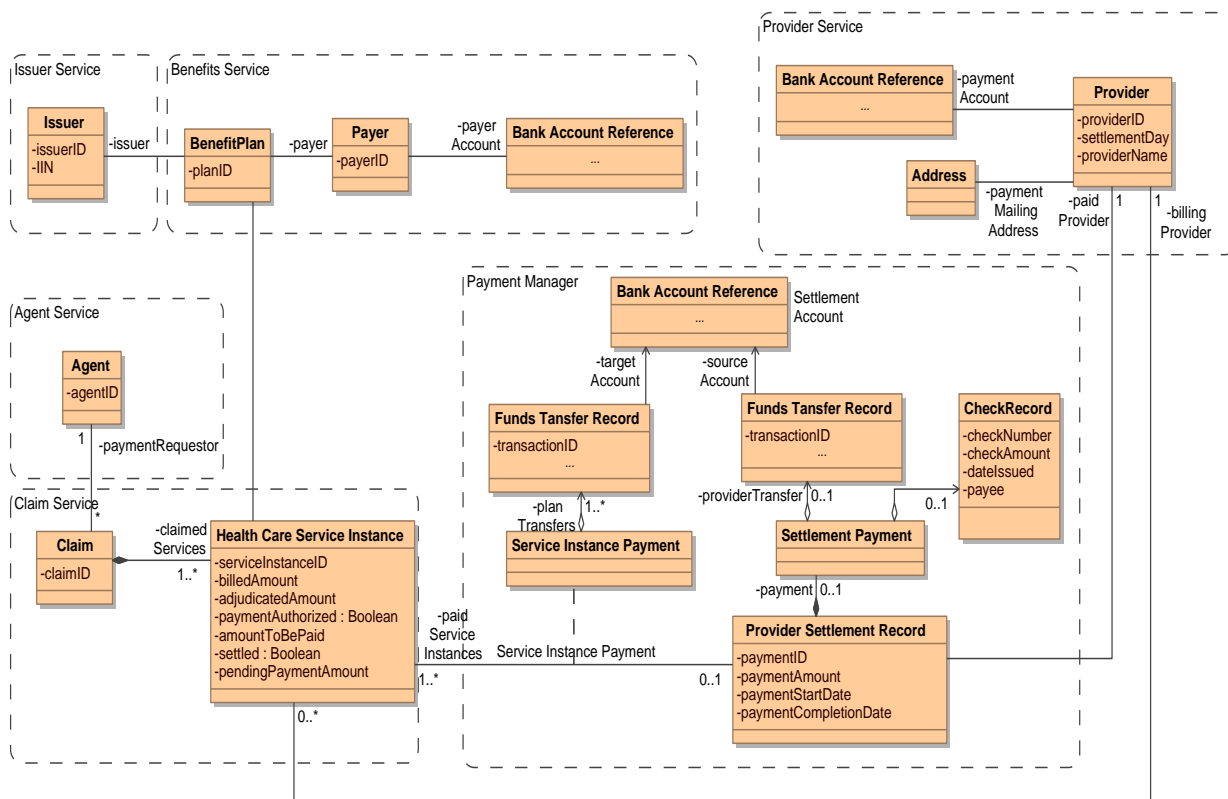
**Figure 4-3**
*Payment Domain Model (Partial)*

Note that from the Payment Manager perspective, the account reference information for both the plan and provider accounts comes from other services. When the Payment Manager uses this information, it is using a copy. If the copy is made immediately before the information is used, this is generally not a problem. However, if the copy is taken well in advance, consideration must be given to what should occur if the original information is updated. For example, consider what happens if the Payment Manager records the provider account at the time it is told to pay the claim. If the payment is deferred, it would be possible for the provider to change the account between this time and the time that the account is settled. How would the Payment Manager know about the account change?

# 5  Solution Architecture Pattern

The business processes of Nouveau Health Care are executed by a collection of components (Figure 5-1). The Claim Router provides an interface for the Billing Provider to submit claims. It validates membership with the Membership Service, routes claims to the Claim Processor, and reports status to the Claim Tracker. The Claim Processor (and there may be more than one) adjudicates the claim, validating membership via the Membership Service, requesting claim payment via the Payment Manager, and reporting status to the Claim Tracker. The Payment Manager pays the service providers, getting the account associated with the plan from the Benefits Service, the account associated with the health care service provider from the Provider Service, and using the Banking Service to make the payments. It also reports status to the Claim Tracker.
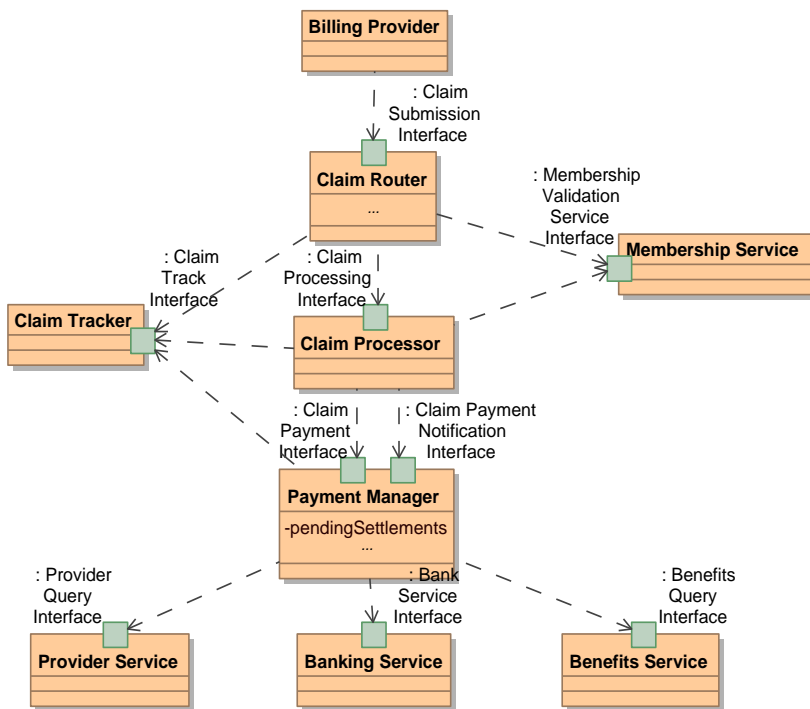
**Figure 5-1**
*Nouveau Health Care Architecture Pattern*

# 6  Processing Claims from Providers

Health care claims can be submitted by either the health care service provider or by the member to whom the service was provided. In the Nouveau Health Care example we focus on the claims submitted by providers and on the payments to those providers.

## 6.1 Business Process Design

In this example the business process design is not documented separately, but is represented in the process-pattern mapping of the next section.

## 6.2 Process-Pattern Mapping

Figure 6-1 presents an overview of the processing of claims submitted by health care service providers. This sunny-day scenario shows provider interactions via the US quasi-standard HIPAA transactions[3] and shows deferred payments to the provider. The process model shows payer and provider account references, but not the details of the interactions with the Benefits Service and Provider Service required to obtain them. Similarly, it shows where membership is validated, but not the interactions with the Member Service that actually does the validation. Finally, for simplicity, all interactions with the Claim Tracker have been omitted.

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[3] In practice, each HIPAA transaction interface that is implemented by an enterprise is extended to accommodate the specific requirements of that enterprise.

| Billing Provider | Claim Router | Claim Processor | Payment Manager | Bank Service |
|---|---|---|---|---|

**submit claims**

**HIPAA 837 claim set**

**validate syntax**

**validate billing provider**

«structured»
**for each claim**

**validate membership**

**determine claim processor**

**submit to claim processor**

**wait for response**

May indicate either acceptance or rejection

**claim in standard format**

**perform claim validation**

**accept/reject notice**

**HIPAA 997 ACK**

**return ACK**

**receive 997 ACK**

**determine whether service is covered**

May result in being billed as another service

**price service**

**update deductable and determine amount to be reimbursed and party to be reimbursed**

Delegation with multiple Confirmations

N   manual review required?
Y

**display for user, obtain manual edits and approval**

approved?
Y1

**payer account reference**

**payment request**

**submit for payment**

«structured»
**for each service**

**move funds to settlement account**

**funds transfer request**

**transfer funds**

**request ACK**

**funds transfer reply**

**claim status**

**wait for ack and update claim status**

**pending settlement**

**HIPAA 277**

**send HIPAA 277**

Deligation with confirmation

**provider account reference**

**send check request**

**receive claim status update**

**pay provider**

**send check**

**payment**

**update claim status**

**send check reply**

**receive payment**

**claim status update1**

**claim status update**

Alternatively, could be a funds transfer

**close claim**

**update status and forward**

Coordination Legend

**synchronous interaction**   **asynchronous interaction**   **delegation interaction**

**Figure 6-1**
*Processing Claims from Providers*

# 7  Business Process 2

# 8  Business Process n

# 9  Addressing Non-Functional Solution Requirements

## 9.1 Performance

Nouveau Health Care expects to handle up to 4.4 million claims per day. At peak times, claims will be submitted at a rate of 620 claims/second.

The average claim payment request has three service instances, but requests associated with hospital stays (about 1% of the total) may contain several hundred service instances.

Immediate payment requests account for about 1% of the total volume. The overall business process response time for an average request will be 8 seconds, and for a large request will be 120 seconds.

There are 1.4 million providers associated with Nouveau. Each provider is typically paid once a month on a working day. Thus the Settle Deferred Payments process runs about 67,000 times a day. Each execution will complete in 8 seconds, and the full batch will be completed in four hours.

At peak, the remaining Claim Payment Interface operations are each invoked 10 times/second and will provide a four second response time.

| Scenario | Overall Scenario Time Budget | Claim Router Time Budget | Claim Processor Time Budget | Payment Manager Time Budget | Bank Service Time Budget |
|---|---|---|---|---|---|
| Immediate payment, small claim | 8 seconds | 0.1 seconds | 3 seconds | 4 seconds | .9 seconds |
| Immediate payment, large claim | 120 seconds | 0.2 seconds | 60 seconds | 60 seconds | .9 seconds |
| Deferred payment, small claim | 2 seconds to HIPAA 997 Ack | 0.1 seconds | 1.9 seconds for accept/reject | N/A | |
| Deferred payment, large claim | 10 seconds to HIPAA 997 Ack | 0.2 seconds | 9.8 seconds for accept/reject | | |
| Settle deferred payments | 8 seconds per provider | | | 7 seconds per provider | 1 second |

## 9.2 Availability within a Data Center

The claim processing business process must be available 99.995% of the time. This budgets to:

*Table 1: Availability Budgets*

| Scenario | Availability | Claim Router Availability | Claim Processor Availability | Payment Manager Availability | Bank Service Availability |
|---|---|---|---|---|---|
| Claim processing submission and immediate payment | 99.995%, 24x7, 5 minutes max outage per incident | 99.999%, 24x7, 1 minute max outage per incident | 99.999%, 24x7, 1 minute max outage per incident | 99.999%, 24x7, 1 minute max outage per incident | 99.999%, 24x7, 1 minute max outage per incident |
| Other processes | 99.995%, 6AM – 12AM, 5 minutes max outage per incident | 99.999%, 6AM – 12AM, 1 minute max outage per incident | 99.999%, 6AM – 12AM, 1 minute max outage per incident | 99.999%, 6AM – 12AM, 1 minute max outage per incident | 99.999%, 6AM – 12AM, 1 minute max outage per incident |

To avoid placing undue availability constraints on individual components, at least two of each component type will be deployed in a high-availability configuration (Figure 9-1). External interactions will occur using an HTTP transport with an IP redirector being used to route requests to the appropriate components. Internal communications within Nouveau Health Care will utilize JMS queues for communications.
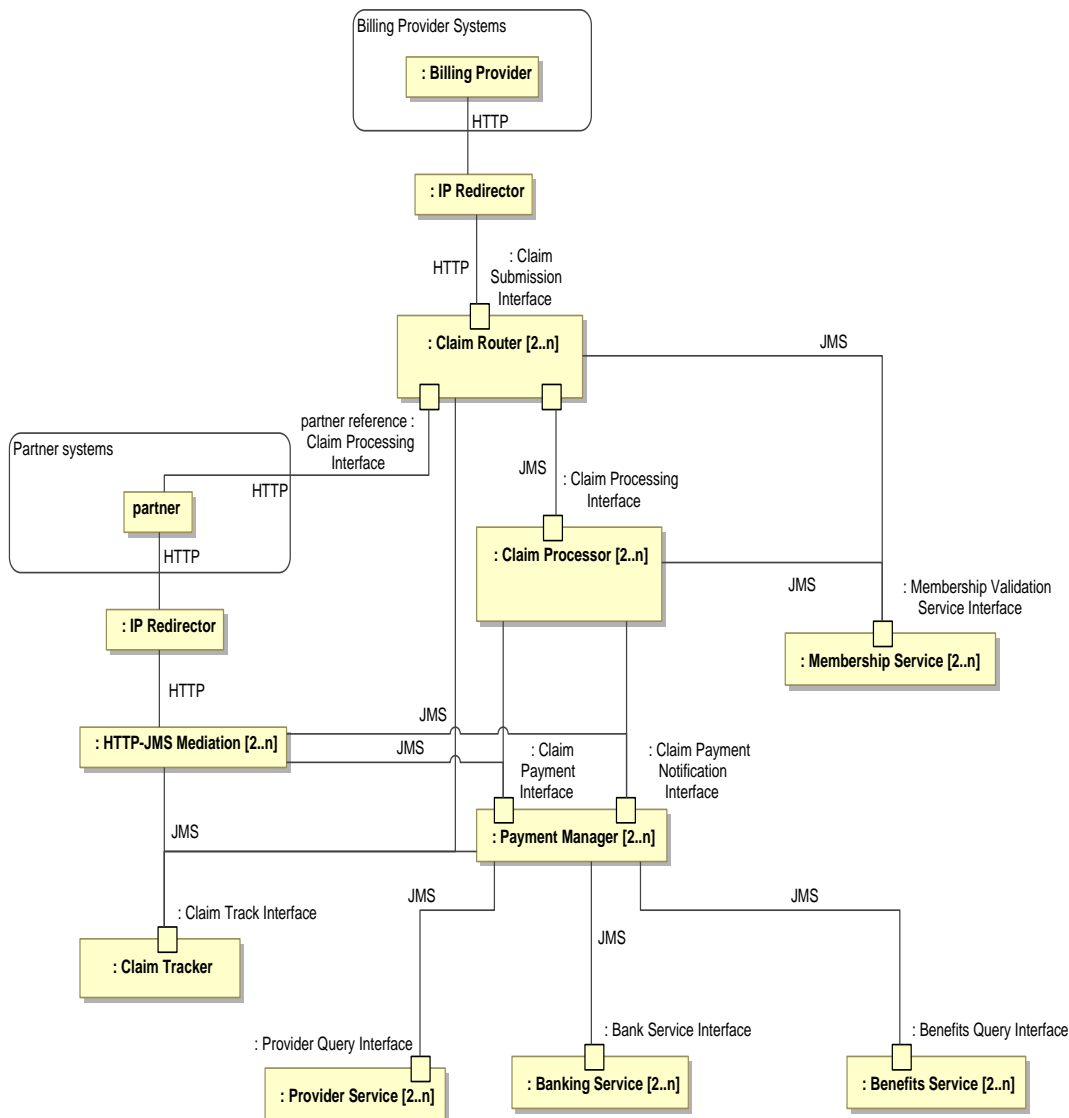


**Figure 9-1**
*Deployment Pattern for High Availability*

The Claim Router presents an HTTP service interface, since it is intended to be used by external parties. All other interfaces will be SOAP/JMS except for the Claim Payment Notification Interface which will use XML/JMS. Partner requests for Claim Tracker and Payment Manager interfaces will use HTTP as a transport, and ActiveMatrix Mediation components will be used to move these requests to and from the JMS transport.

## 9.3 Site Disaster Recovery

In the event of a site disaster recovery, the recovery time objective for the claim processing business process is two hours, and the recovery point objective is 120 seconds. The budget for each component is

one hour recovery time objective and 60 seconds recovery point objective. Asynchronous replication of disks between the data centers will be used to keep the disaster recovery site up to date in near real time. Upon failover, all components at the disaster recovery site will be cold-started.

## 9.4 Security

All service invocations require certificate-based authentication and authorization using web service standards. In all cases, WS-Security will be used to encrypt the message body.

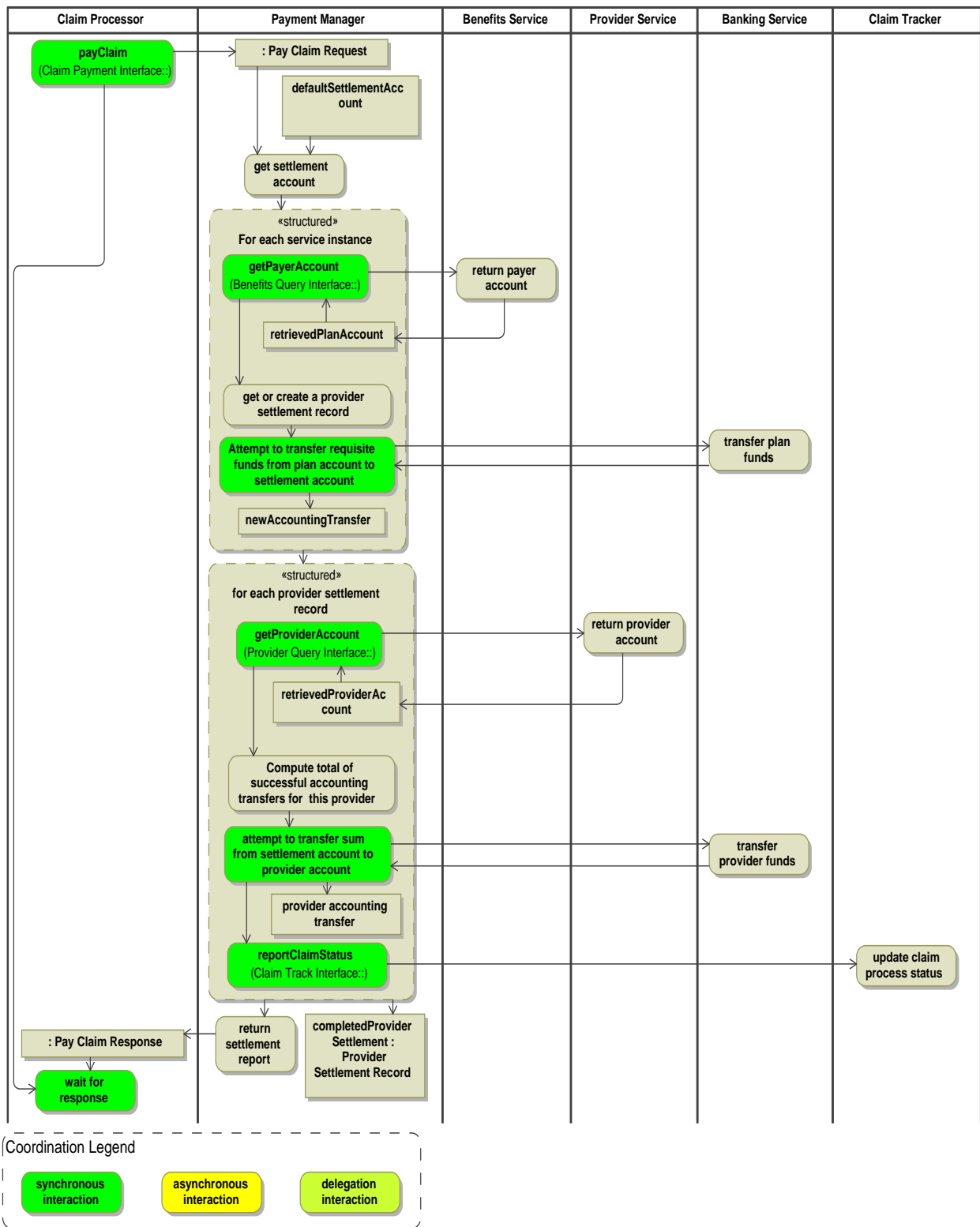# 10 Payment Manager Service

## 10.1 Business Process Involvement

Under normal circumstances, payments are made to health care providers on a periodic (typically monthly) basis. These are referred to as deferred payments. Periodically a process runs to settle (pay) these deferred payments. By exception, claims can be paid immediately. This is generally done as a remedial action for claims that have been excessively delayed in processing for one reason or another.

From this, we see that the Manage Payments process actually consists of three processes (Figure 10-1): Immediate Payment, Deferred Payment, and Settle Deferred Payments.
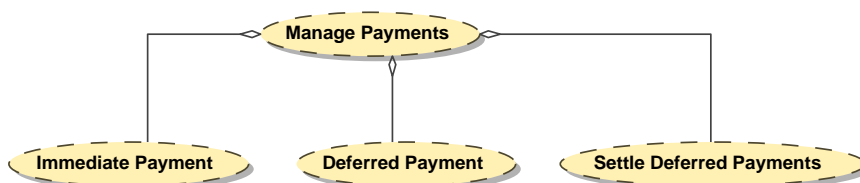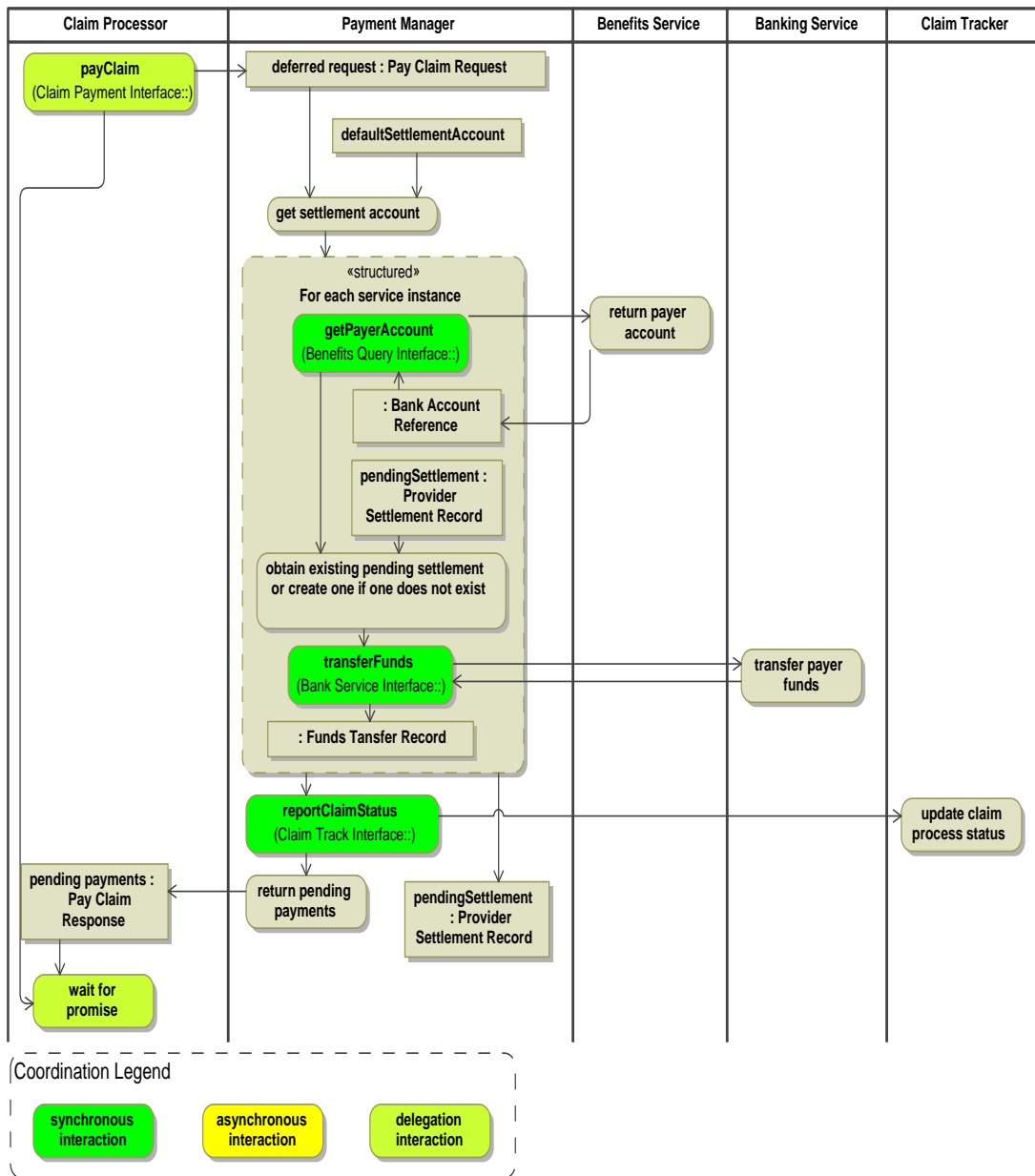


**Figure 10-1**
*Manage Payments Processes*

**Figure 10-2**
*Payment Manager Immediate Payment Process*

**Figure 10-3**
*Payment Manager Deferred Payment Process*
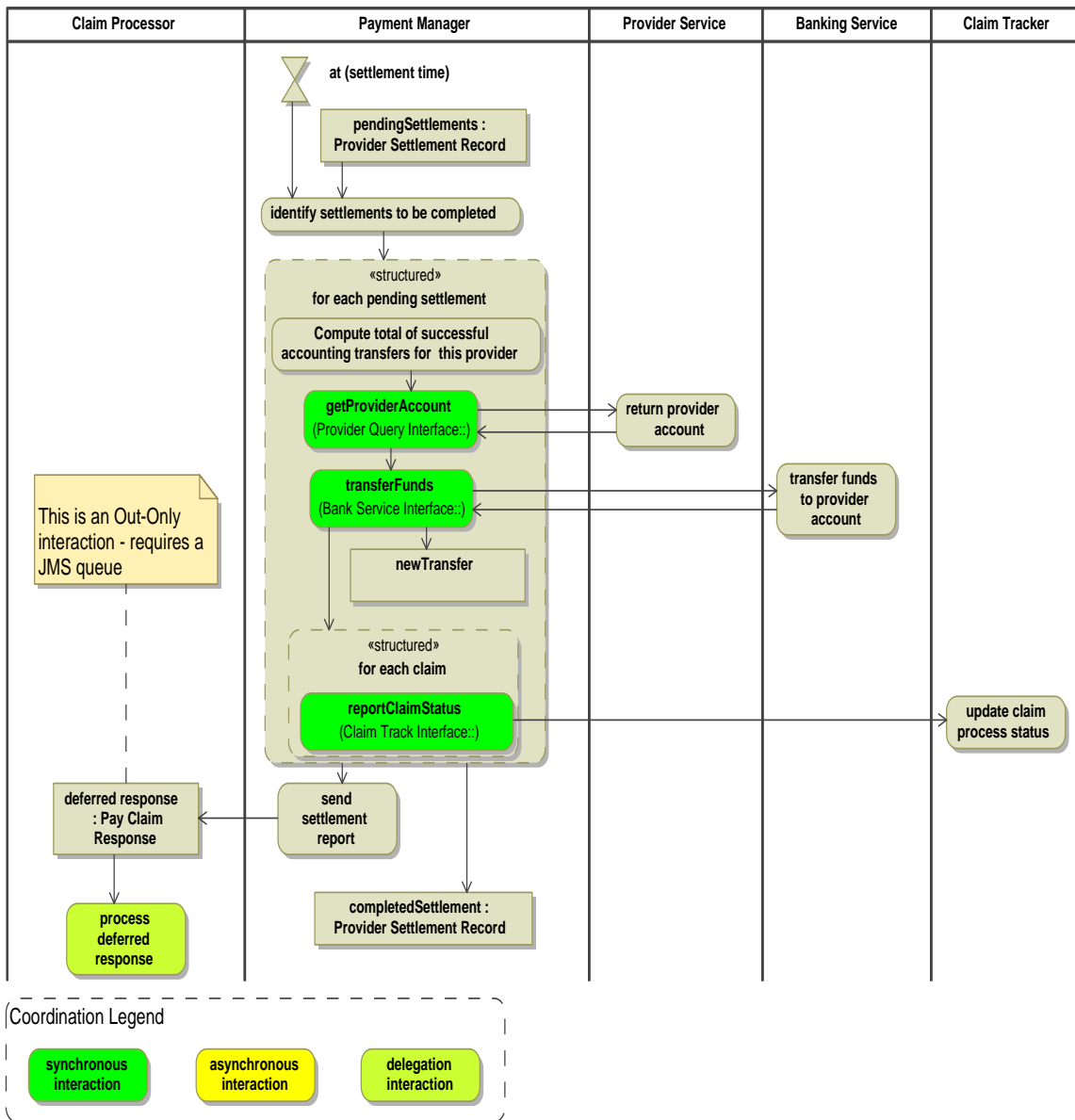
**Figure 10-4**
*Payment Manager Settle Deferred Payments Process*

## 10.2 Interfaces

The interfaces presented by the payment manager are shown in Figure 10-5 and detailed in the Payment Manager Specification document.
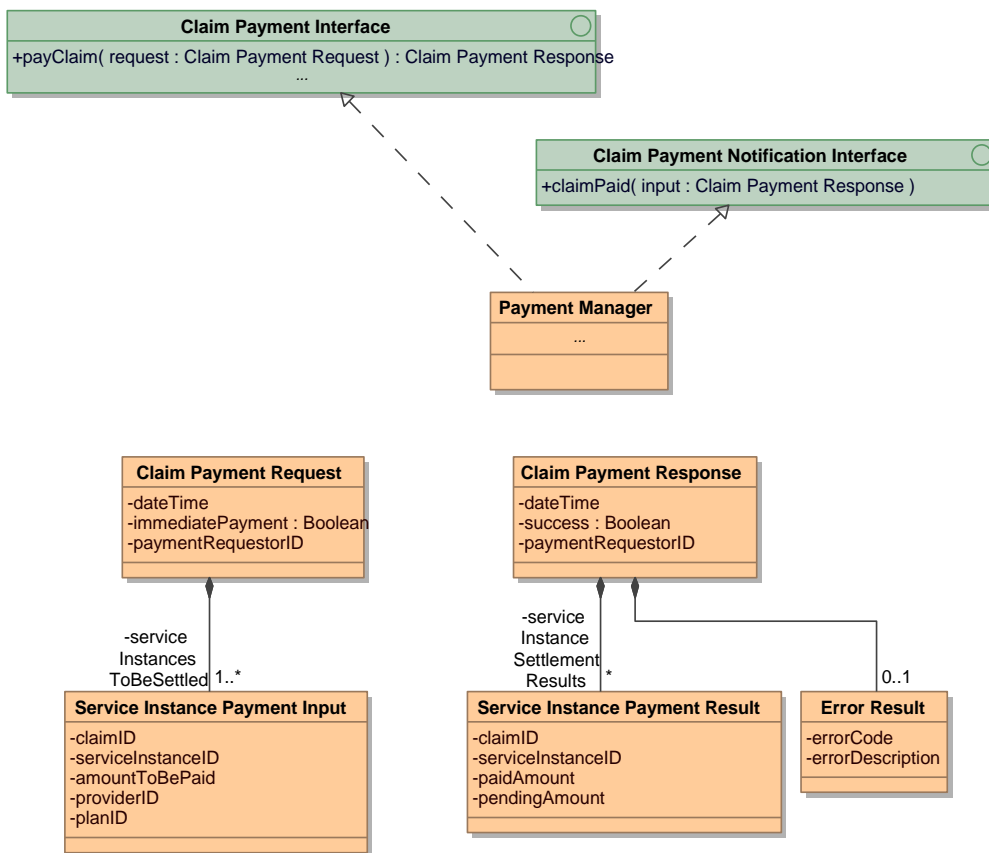
**Figure 10-5**
*Payment Manager Service Interfaces for Claim Payment*

## 10.3 Observable Architecture

The observable architecture of the payment manage is shown in Figure 5-1.

## 10.4 Observable State

The observable state of the payment manager is shown in Figure 10-6 and detailed in the Payment Manager Specification document.
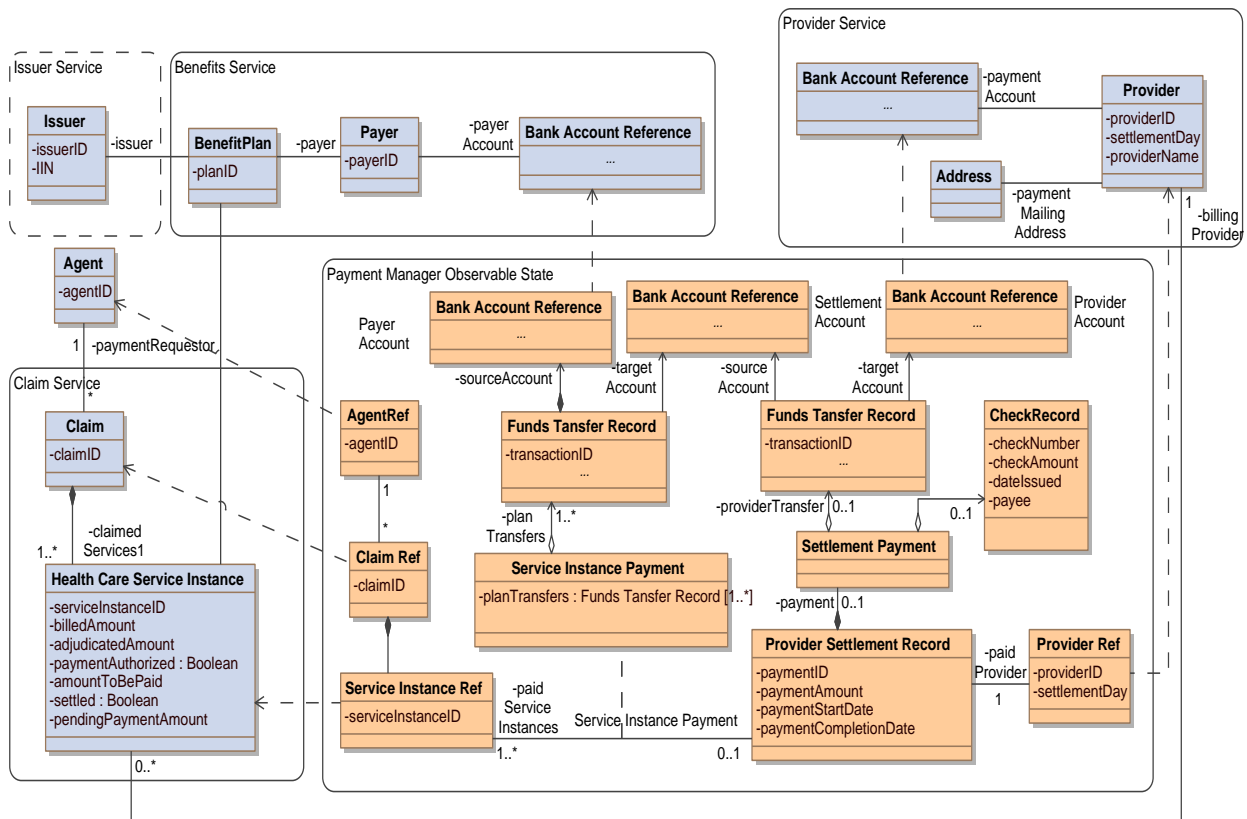
**Figure 10-6**
*Payment Manager Observable State*

# 10.5 Coordination

When immediate payment is requested, the service consumer (e.g. Process Claim) requests the payment using the synchronous request-reply coordination pattern (Figure 10-7). The response indicates whether or not the payments were successfully made.
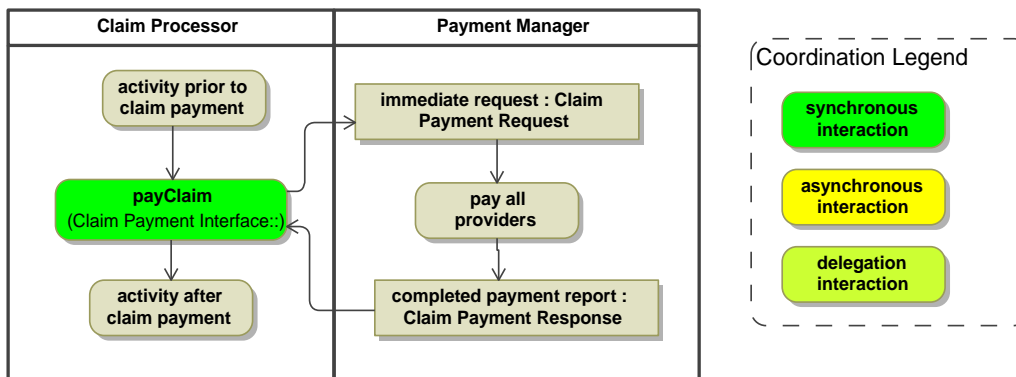


**Figure 10-7**
*Immediate Payment Coordination*

For Deferred Payment (Figure 10-8), the exchange between the service consumer and Payment Manager is the front end of a delegation with confirmation interaction. This portion of the interaction simply returns a promise to make the payments at some point in the future. The back end of the delegation with confirmation interaction is the Settle Deferred Payment process, which is triggered by a timer.



**Figure 10-8**
*Deferred Payment and Settlement Coordination*

## 10.6 Constraints

There are some restrictions on the interactions that can occur:
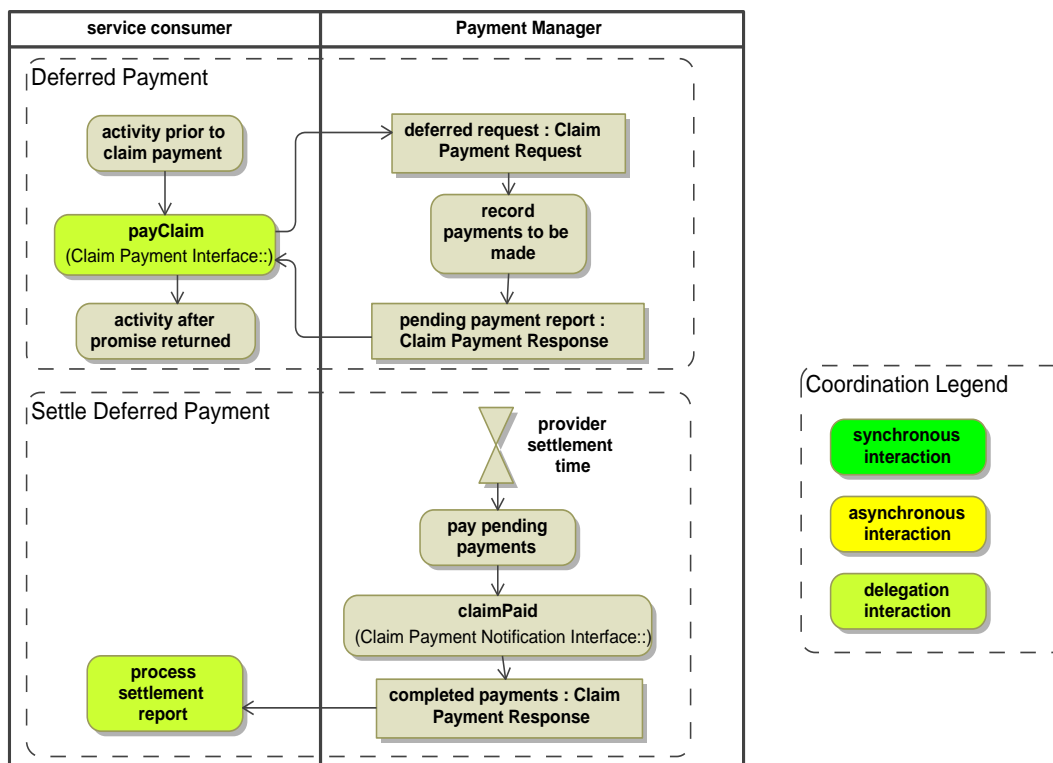
[lb]    It is invalid to call the Claim Payment Notification Interface claimPaid() operation for a claim for which the Claim Payment Interface's payClaim() operation has not been invoked.

[lb]    It is invalid to call the Claim Payment Interface cancelPendingPayments for a claim for which:

[lb]    payClaim() has not been called

[lb]    The payment has already been made

*In a full specification, the triggered behavior mappings would include scenarios to indicate what would happen in each of these circumstances.*

## 10.7 Non-Functional Behavior

### 10.7.1    Performance

Nouveau Health Care expects to handle up to 4.4 million claims per day. At peak times, payClaim() deferred payment requests may arrive at a rate of 620 requests/second. The service will provide a two second response time during these peak periods for average requests.

The average claim payment request has three service instances, but requests associated with hospital stays (about 1% of the total) may contain several hundred service instances. Response time for these requests will be 10 seconds.

Immediate payment requests account for about 1% of the total volume. Response time for an average request will be four seconds, and for a large request will be 60 seconds.

There are 1.4 million providers associated with Nouveau. Each provider is typically paid once a month on a working day. Thus the Settle Deferred Payments process runs about 67,000 times a day. Each execution will complete in 4 seconds, and the full batch will be completed in four hours.

At peak, the remaining Claim Payment Interface operations are each invoked 10 times/second and will provide a four second response time.

### 10.7.2    Availability within a Data Center

The payClaim() and claimPaid() operations will be available 99.999% of the time on a 24x7 basis. There will be no scheduled outage times for this operation. Maximum outage time per incident is 60 seconds.

The remaining Claim Payment Interface operations will be available 99.999% of the time from 6 AM through 12 AM Eastern time. Maximum outage time per incident is 60 seconds.

### 10.7.3    Site Disaster Recovery

In the event of a site disaster recovery, the recovery time objective for the Payment Manager is one hour, and the recovery point objective is 60 seconds.

### 10.7.4    Security

All invocations of the Claim Payment Interface operations require certificate-based authentication and authorization using web service standards. In all cases, WS-Security will be used to encrypt the message body.

# 11 Claim Router

This chapter will serve as both the specification and implementation architecture document for the Claim Router.

## 11.1 Business Process Involvement

Figure 11-1 shows the involvement of the Claim Router in claim processing.
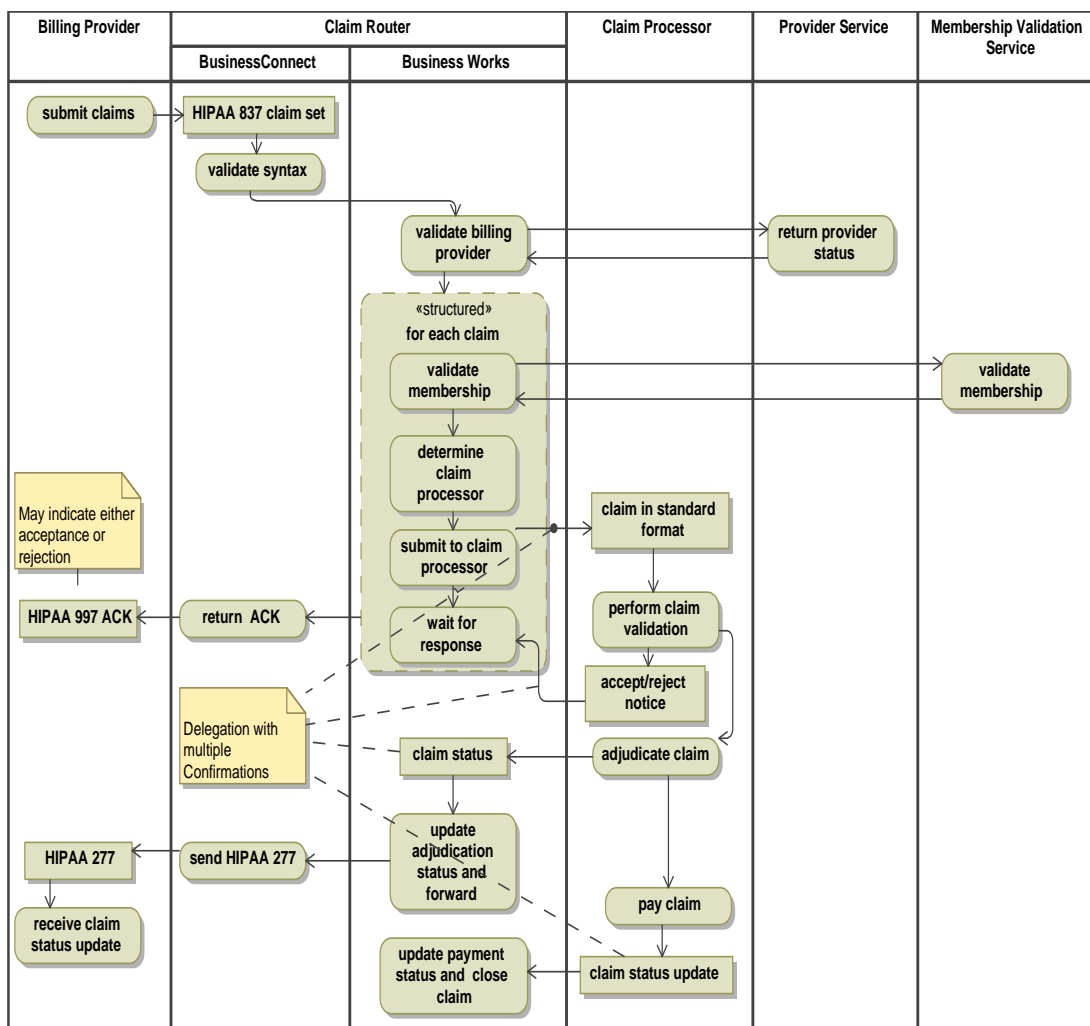
**Figure 11-1**
*Claim Processor Involvement in Claim Processing*

## 11.2 Interfaces

The details of the Claim Submission Interface have yet to be defined.

## 11.3 Observable Architecture
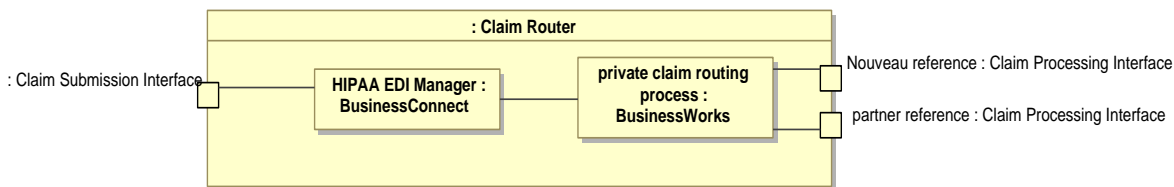


**Figure 11-2**
*Claim Router Architecture*

## 11.4 Observable State

There is no observable state maintained by the router. Overall process state information is being maintained by the Claim Tracker.

## 11.5 Coordination

Coordination between the Claim Submitter and the Claim Router is Delegation with Confirmation.

## 11.6 Constraints

There are no constraints on the use of the interface.

## 11.7 Non-Functional Behavior

The non-functional requirements for this component are covered in Chapter 9.

# 12 Claim Processor
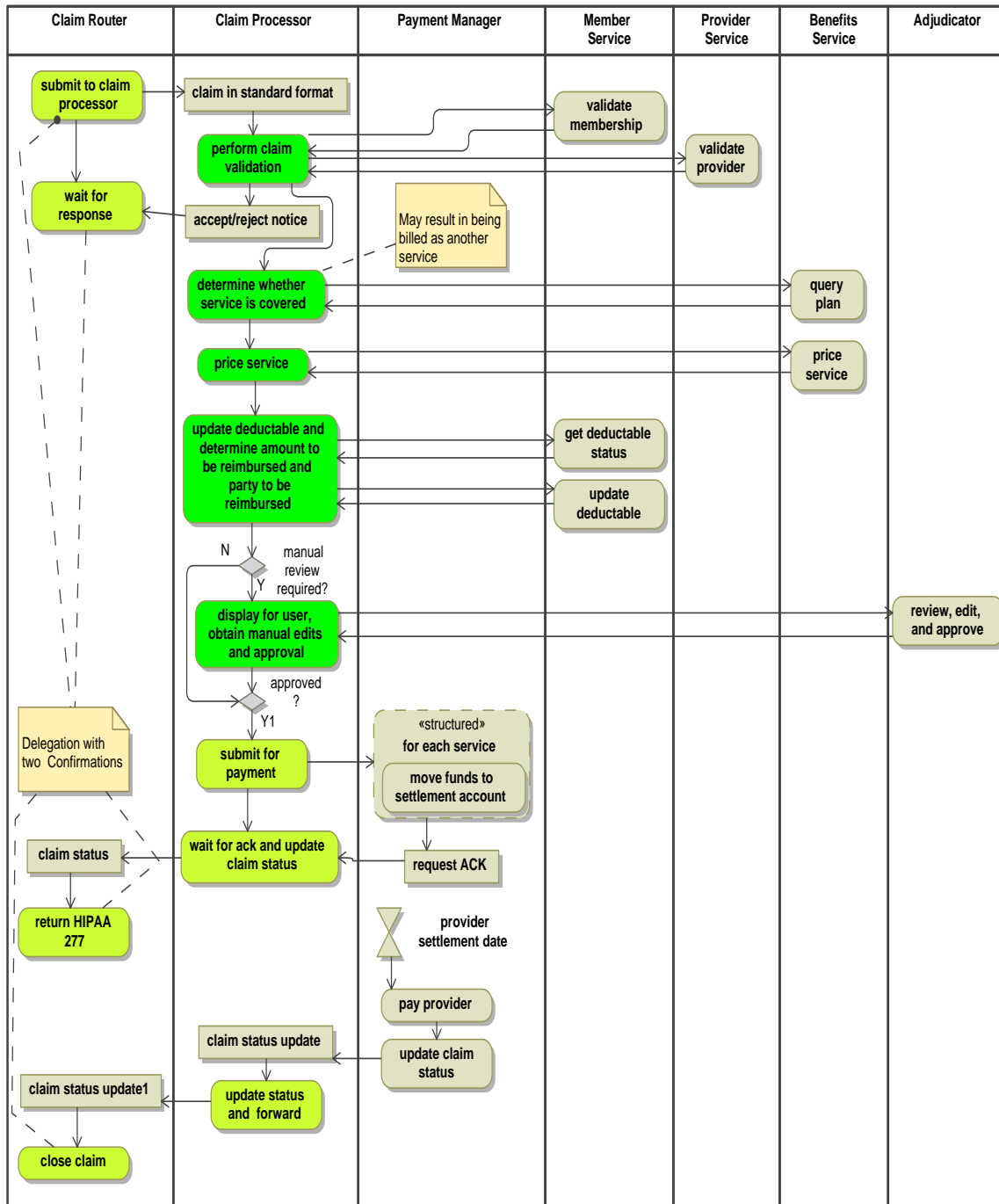
## 12.1 Business Process Involvement

**Figure 12-1**
*Claim Processor Participation in Claim Processing*

## 12.2 Interfaces

The details of the Claim Processing Interface have yet to be defined.

## 12.3 Observable Architecture

The observable architecture for this component is depicted in Figure 5-1 and Figure 9-1.

## 12.4 Observable State

The observable state for this component has yet to be defined.

## 12.5 Coordination

Coordination is Delegation with Confirmation.

## 12.6 Constraints

The constraints on this component have yet to be defined.

## 12.7 Non-Functional Behavior

The non-functional requirements for this component are covered in Chapter 9.

# 13 Membership Service

## 13.1 Business Process Involvement

See Figure 11-1 and Figure 12-1.

## 13.2 Interfaces



**Figure 13-1**
*Membership Validation Service Interface*

## 13.3 Observable Architecture



**Figure 13-2**
*Membership Service Observable Architecture*

## 13.4 Observable State

The service is stateless. All relevant state is contained in the back-end systems.

## 13.5 Coordination

Coordination is synchronous request-reply.

## 13.6 Constraints

There are no constraints on the use of this service.

## 13.7 Non-Functional Behavior
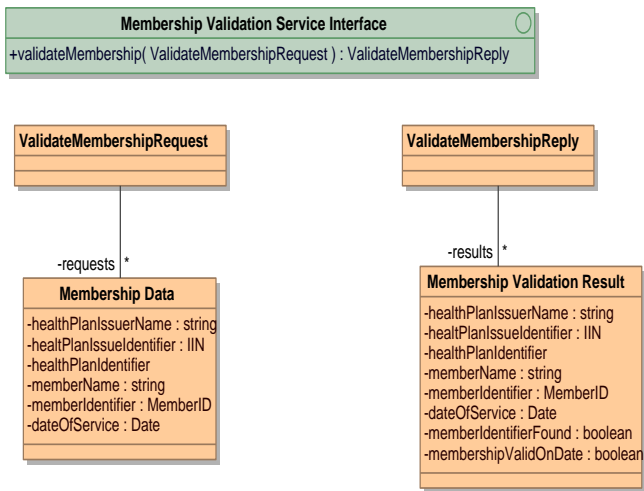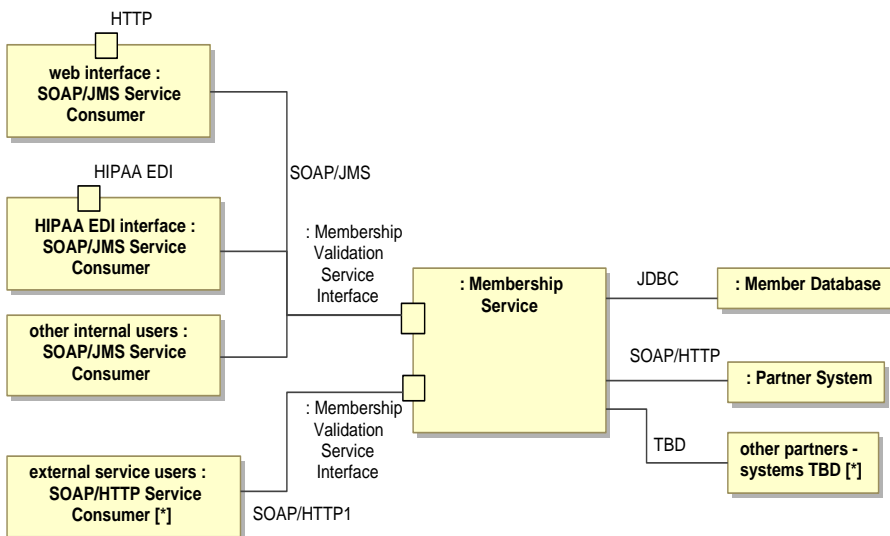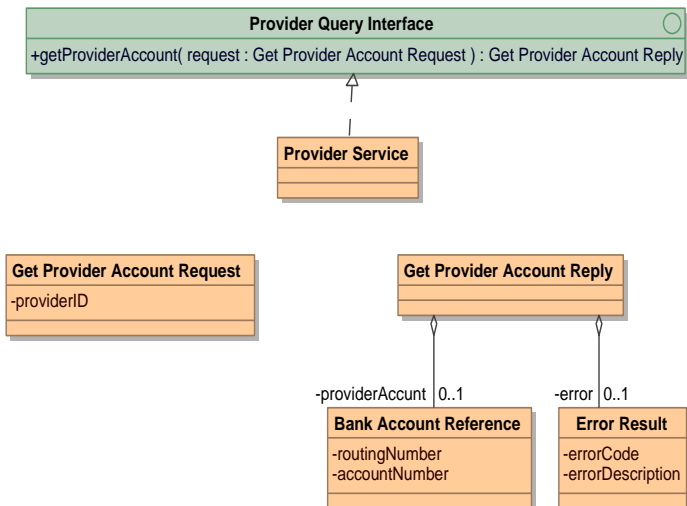
The non-functional requirements for this component are covered in Chapter 9.

# 14 Provider Service

## 14.1 Business Process Involvement

See Figure 10-2 and Figure 10-4.

## 14.2 Interfaces

```
┌────────────────────────────────────────────────────────────────┐
│              Provider Query Interface                      ○      │
├────────────────────────────────────────────────────────────────┤
│ +getProviderAccount( request : Get Provider Account Request ) : Get Provider Account Reply │
└────────────────────────────────────────────────────────────────┘
                              △
                              │
                    ┌──────────────────┐
                    │  Provider Service │
                    ├──────────────────┤
                    │                  │
                    └──────────────────┘

┌──────────────────────────┐          ┌──────────────────────────┐
│ Get Provider Account Request │        │ Get Provider Account Reply │
├──────────────────────────┤          ├──────────────────────────┤
│ -providerID              │          │                          │
└──────────────────────────┘          └──────────────────────────┘

            -providerAccunt │ 0..1            -error │ 0..1
          ┌──────────────────────┐      ┌──────────────────┐
          │  Bank Account Reference │     │   Error Result   │
          ├──────────────────────┤      ├──────────────────┤
          │ -routingNumber       │      │ -errorCode       │
          │ -accountNumber       │      │ -errorDescription │
          └──────────────────────┘      └──────────────────┘
```

**Figure 14-1**
*Provider Query Interface*

## 14.3 Observable Architecture

The observable architecture of this component has yet to be defined.

## 14.4 Observable State

This component is stateless. Relevant state lies in the underlying back-end systems.

## 14.5 Coordination

Coordination is synchronous request-reply.

## 14.6 Constraints

There are no constraints on the use of this service.

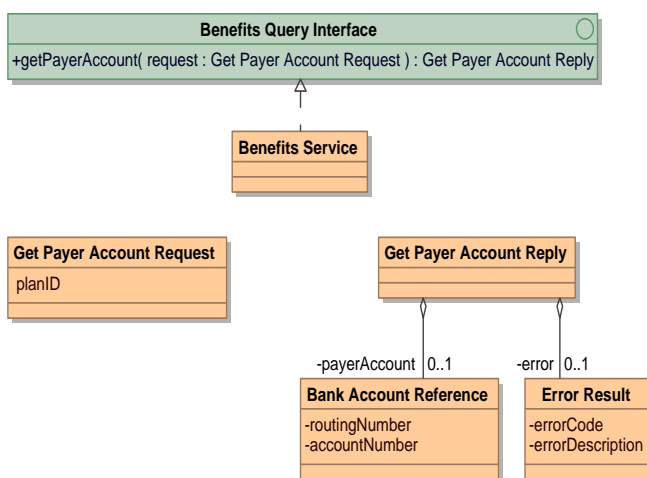## 14.7 Non-Functional Behavior

The non-functional requirements for this component are covered in Chapter 9.

# 15 Benefits Service

## 15.1 Business Process Involvement

See Figure 10-2 and Figure 10-3.

## 15.2 Interfaces



**Figure 15-1**
*Benefits Query Interface*

## 15.3 Observable Architecture

The observable architecture of this component has yet to be defined.

## 15.4 Observable State

This service is stateless. Relevant state information lies in the underlying back-end systems.

## 15.5 Coordination

Coordination is synchronous request-reply.

## 15.6 Constraints

There are no constraints on the use of this service.
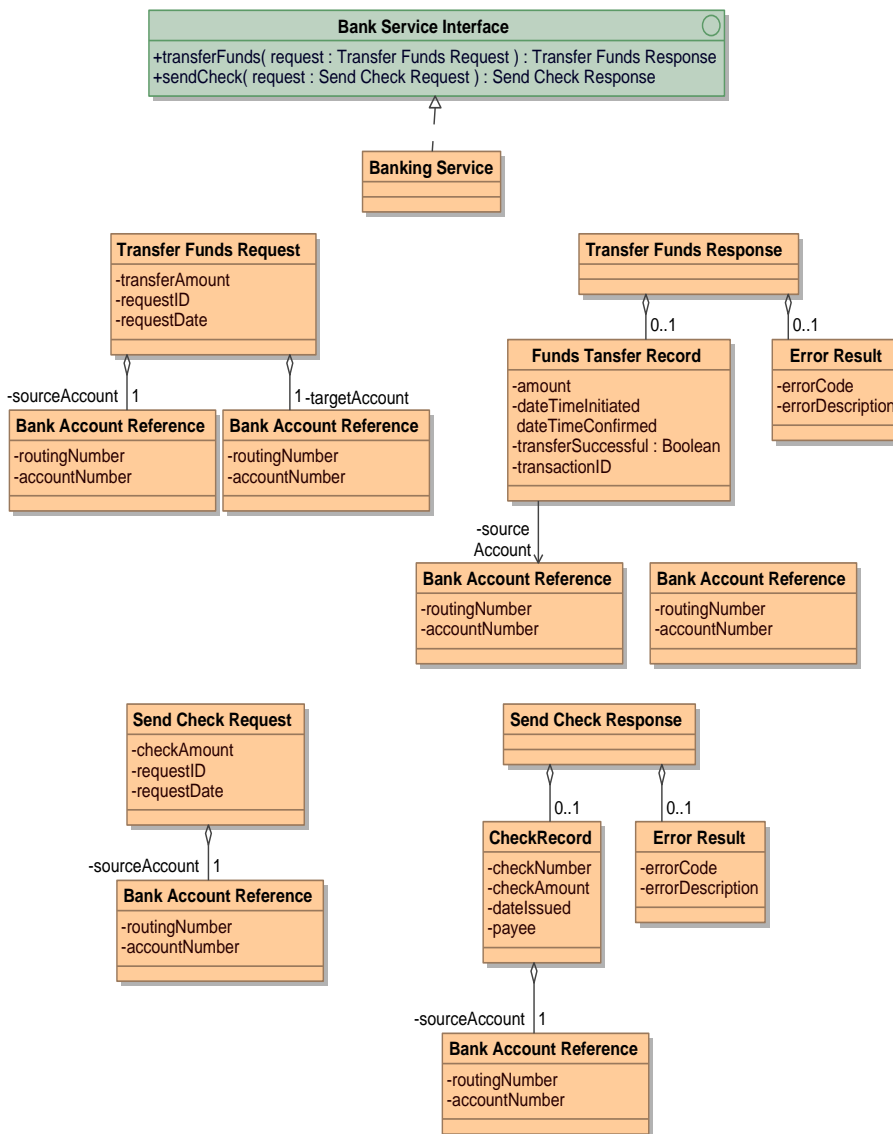
## 15.7 Non-Functional Behavior

The non-functional requirements for this component are covered in Chapter 9.

# 16 Banking Service

## 16.1 Business Process Involvement

See Figure 10-2 and Figure 10-4.

## 16.2 Interfaces



**Figure 16-1**
*Bank Service Interface*

## 16.3 Observable Architecture

The observable architecture for this component has yet to be defined.

## 16.4 Observable State

The observable state for this component has yet to be defined.

## 16.5 Coordination

Interaction with this component will use synchronous request-reply coordination.

## 16.6 Constraints

There are no constraints on the use of this service.
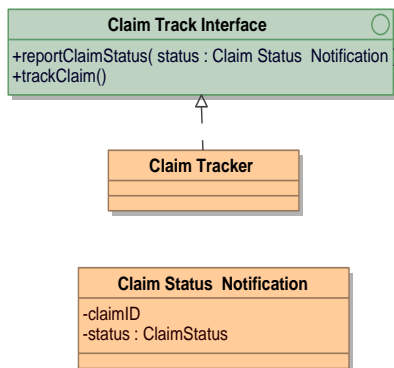
## 16.7 Non-Functional Behavior

The non-functional requirements for this component are covered in Chapter 9.

# 17 Claim Tracker

## 17.1 Business Process Involvement

See Figure 10-2, Figure 10-3, Figure 10-4, and Figure 11-1. The details of interacting with the Claim Processor have yet to be defined.
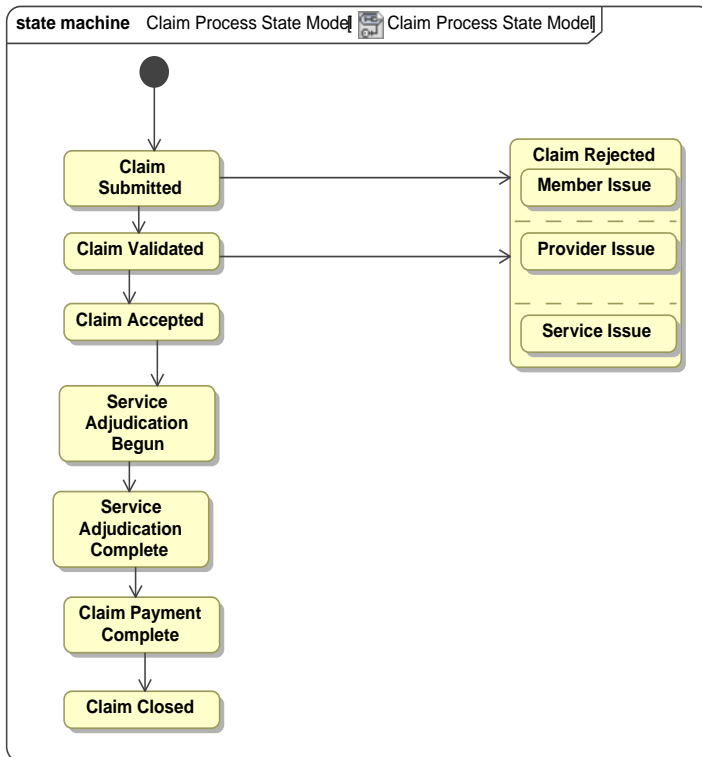
## 17.2 Interfaces



**Figure 17-1**
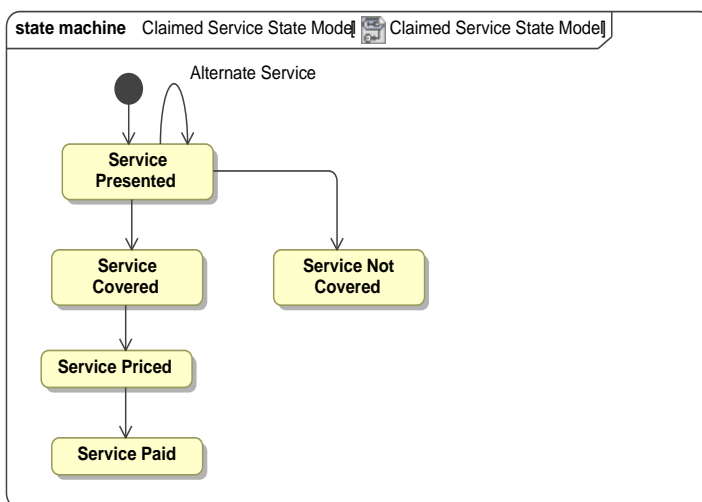*Claim Tracker Interface*

## 17.3 Observable Architecture

The claim tracker is a self-contained service.

## 17.4 Observable State



**Figure 17-2**

*Claim Tracker Observable State: Overall Claim Processing*



**Figure 17-3**

*Claim Tracker Observable State: Individual Services on a Claim*

## 17.5 Coordination

Interaction with the reportClaimStatus() operation is one-way (fire-and-forget). Interaction with the trackClaim() operation is synchronous request-reply.

## 17.6 Constraints

There are no constraints on the use of this service.

## 17.7 Non-Functional Behavior

The non-functional requirements for this component are covered in Chapter 9.

# 18 HTTP-JMS Mediation

## 18.1 Business Process Involvement

This component is involved as a supporting component for all interactions between the partner's claim processor and Nouveau's Claim Tracker and Payment Manager.

## 18.2 Interfaces

See the Claim Tracker and Payment Manager interfaces.

## 18.3 Observable Architecture

This component will be an ActiveMatrix Service Bus node with Mediation components.

## 18.4 Observable State

The component is stateless.

## 18.5 Coordination

Coordination will be that specified for each of the referenced interfaces.

## 18.6 Constraints

There are no constraints on the use of this component.

## 18.7 Non-Functional Behavior

The non-functional requirements for this component are covered in Chapter 9.

# 19 Deployment

## 19.1 Deployment Environment Migration

The migration details are yet to be defined.

## 19.2 Development Configuration

This configuration is yet to be defined.

## 19.3 Test Configuration

This environment is yet to be defines.

## 19.4 Production Configuration

See Figure 9-1.

# 20 Integration and Testing Requirements

## 20.1 Integration Strategy

TBD

## 20.2 Behavioral Testing

TBD

## 20.3 Performance Testing

TBD

## 20.4 Performance Testing

TBD

# Appendix A: Common Data Format Specifications

# Appendix B: Message Format Specifications

# Appendix C: Service Interface Specifications

# Appendix D: Data Storage Specifications