JXTA & Web Services Integration
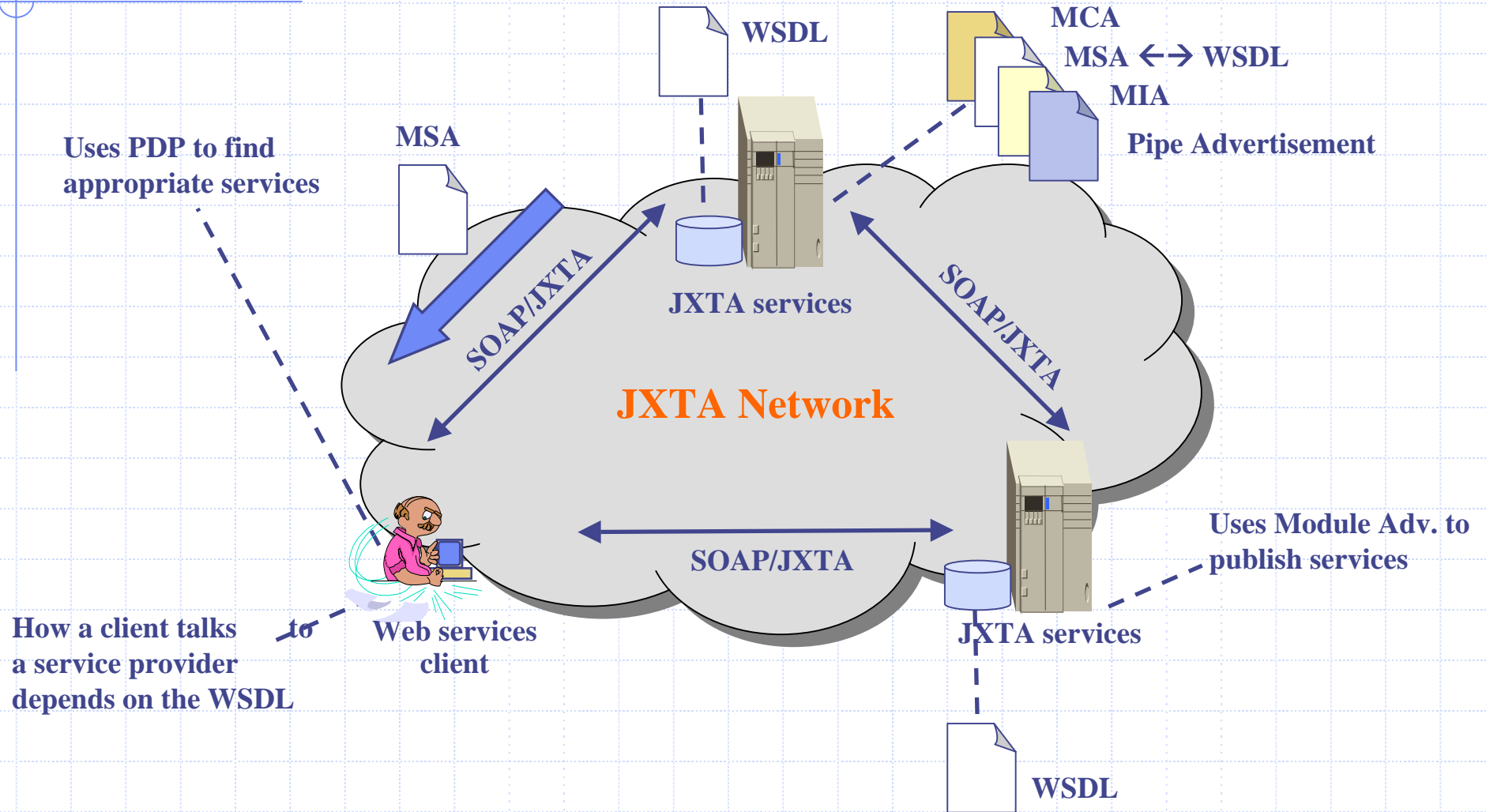
sting@itri.org.tw
ChoJunLee@itri.org.tw

Web Services Architecture

WSDL

WSDL

Green pages
White pages
Yellow pages

Uses UDDI to find
appropriate Web
services

UDDI
XML / SOAP

Web services
repository

UDDI
XML / SOAP

XML/SOAP

Web

Uses UDDI to register a
Web service with the
repository

How a client talks to
a service provider
depends on the WSDL

Web services
client

Web services
provider

UDDI	WSDL

SOAP

FTP	HTTP	SMTP

JXTA Services Architecture

WSDL

MCA

MSA ←→ WSDL

MIA

Pipe Advertisement

MSA

Uses PDP to find appropriate services

SOAP/JXTA

JXTA services

SOAP/JXTA

JXTA Network

SOAP/JXTA

Uses Module Adv. to publish services

Web services client

JXTA services

How a client talks to a service provider depends on the WSDL

WSDL

JXTA & Web Services Integration
JXTA → Web Services

JXTA Network

(Public) interface (WSDL using SOAP/**JXTA**)

MCA
MSA
Pipe Advertisement

Public interface to dynamically add and remove web services(WSDL using SOAP/HTTP)

Web Service

Web Service
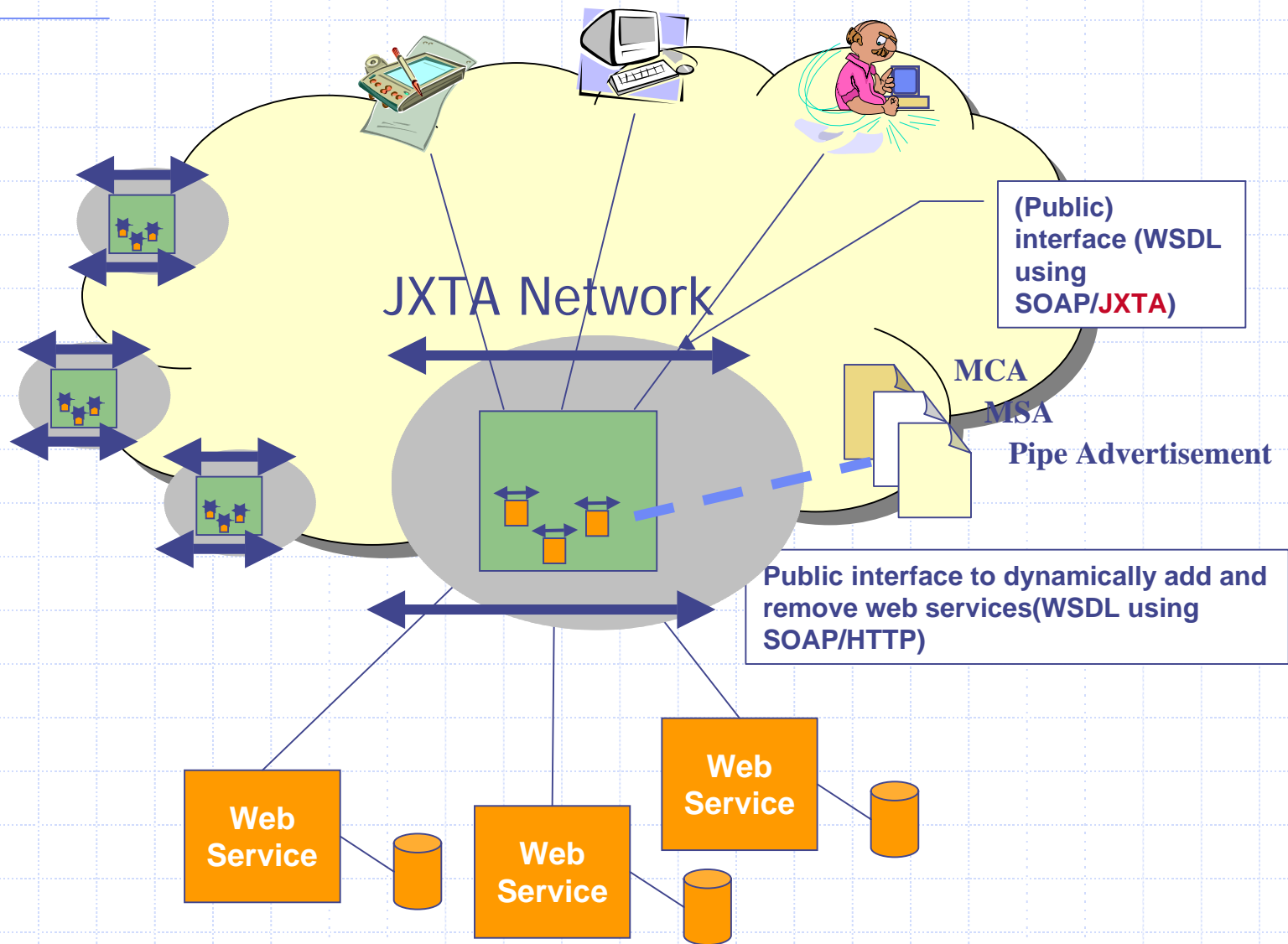
Web Service

JXTA & Web Services Integration

Web Services → JXTA

MCA
MSA
Pipe Advertisement

JXTA services

(Public) interface (WSDL using SOAP/JXTA)

JXTA Network

Web services interface or proxy implementing the interface is added to the UDDI

UDDI
Look up
/
Registry

Public interface to dynamically add and remove web services(WSDL using SOAP/HTTP)
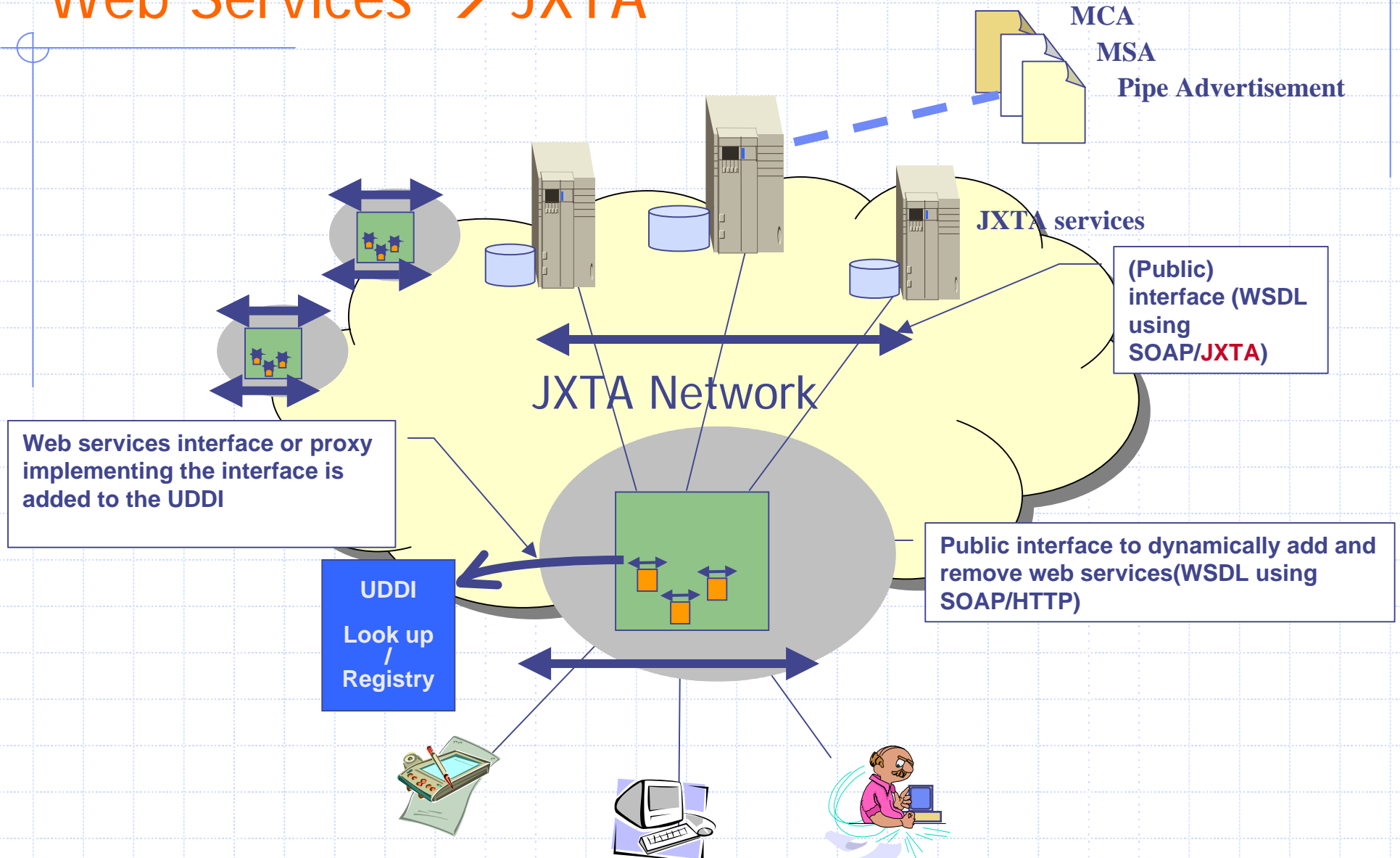
Service Invocation through WSDL/SOAP in JXTA

Client Application

Foo(3, 4)

AXIS

SOAP

pipe

JXTA

Service

Foo(3, 4)

AXIS

SOAP

pipe

JXTA
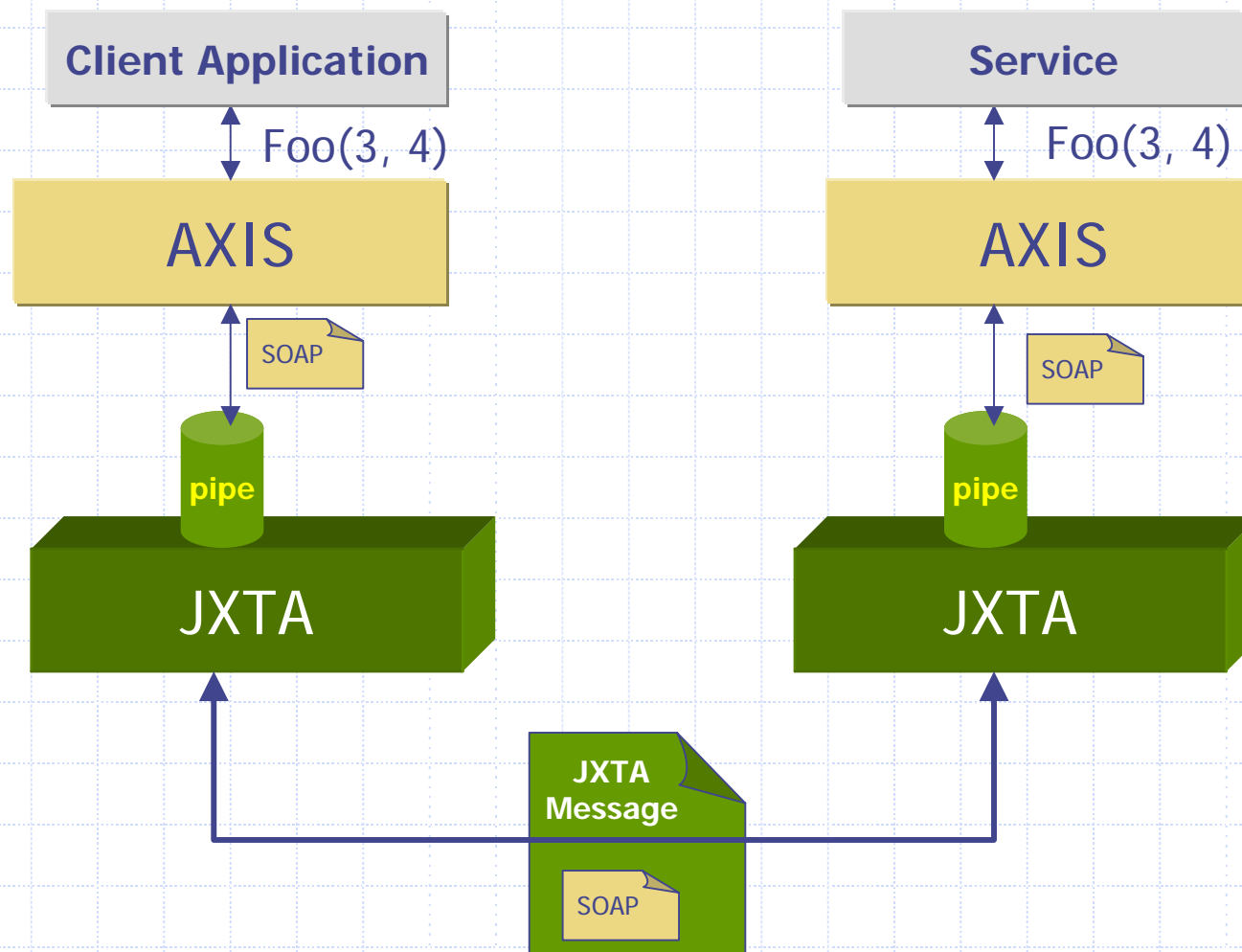
JXTA Message

SOAP

AXIS Client Side Message Processing System

Web Services Request Chain

Global Request Chain

Transport-specific Chain

Request Handlers

Handler	Handler
Handler	Handler

MSG

2

3 MSG

MSG

Handler .... Handler

MSG

4

SOAP Request

Client Application

1

Axis Engine (Axis Client)

9

5 **Transport Sender (Pivot Handler)**

SOAP Reponse

MSG **8**

MSG **7**

6

MSG

Handler	Handler
Handler	Handler

MSG

Handler .... Handler

Response Handlers

Web Service Response Chain

Global Response Chain

MSG **= MessageContext**

Plugin JXTA Transport Sender into AXIS

Transport-specific Chain

Request Handlers

MSG

| Handler | ···· | Handler |

MSG

AXIS

**Jxta Transport Sender
(Pivot Handler)**

SOAP
Request

SOAP

SOAP
Reponse

Pipe

JXTA

Peer Discovery Protocol

Peer Imformation Protocol

Pipe Binding Protocol

Peer Resolver Protocol

Peer Endpoint Protocol

**JXTA
Message**

SOAP

MSG

| Handler | ···· | Handler |

MSG

Response Handlers
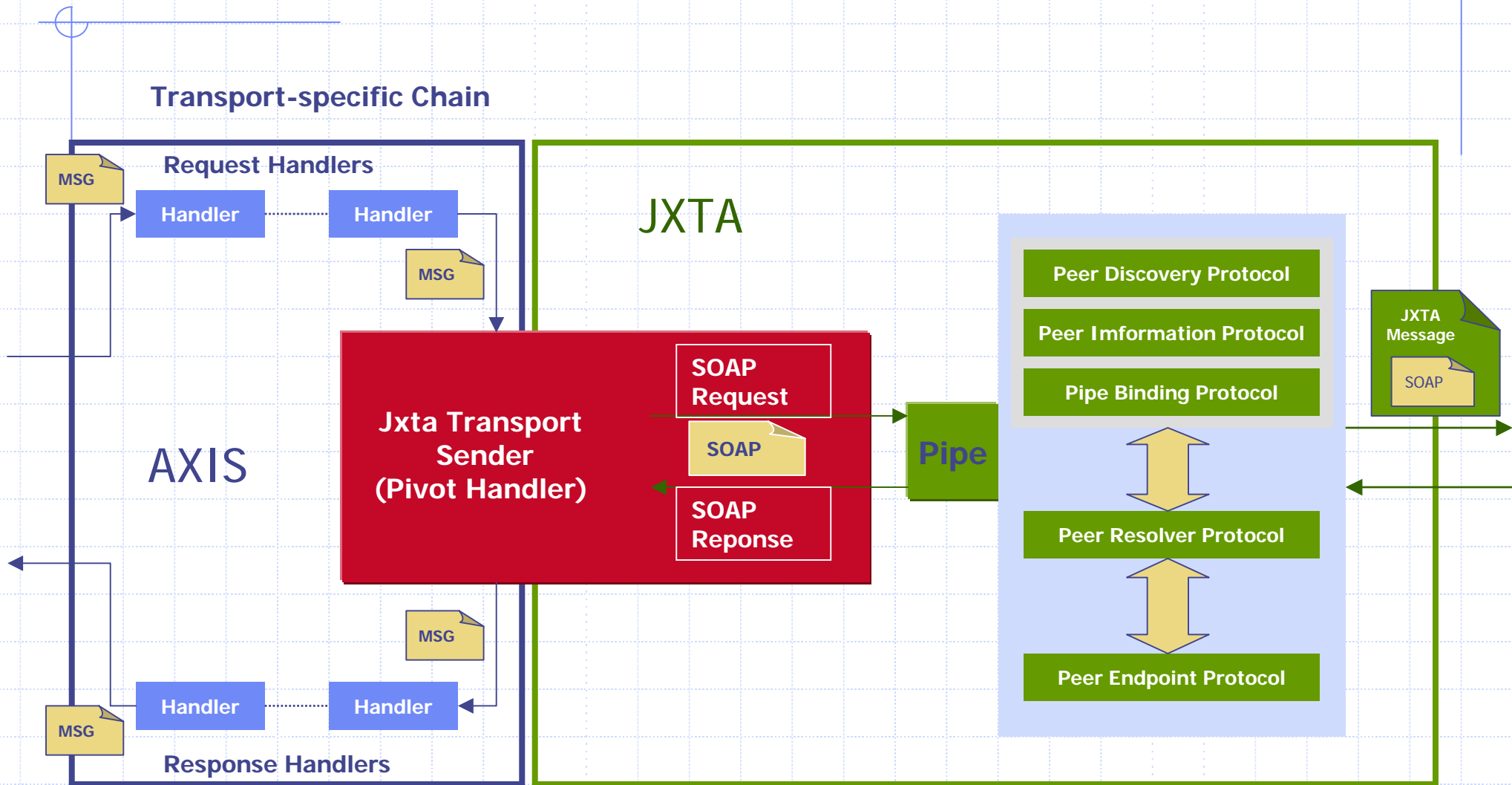
Module Specification Adv.

```
<jxta:MSA>
<MSID>...</MSID>
<Name>...</Name>
<Crtr>...</Crtr>

<SURI>http://url to its WSDL</SURI>
<Vers>...</Vers>

<Desc>...</Desc>
<Parm>...</Parm>

<jxta:PipeAdvertisement>...</jxta:PipeAdvertisement>
<Proxy>...</Proxy>
<Auth>...</Auth>

</jxta:MSA>
```
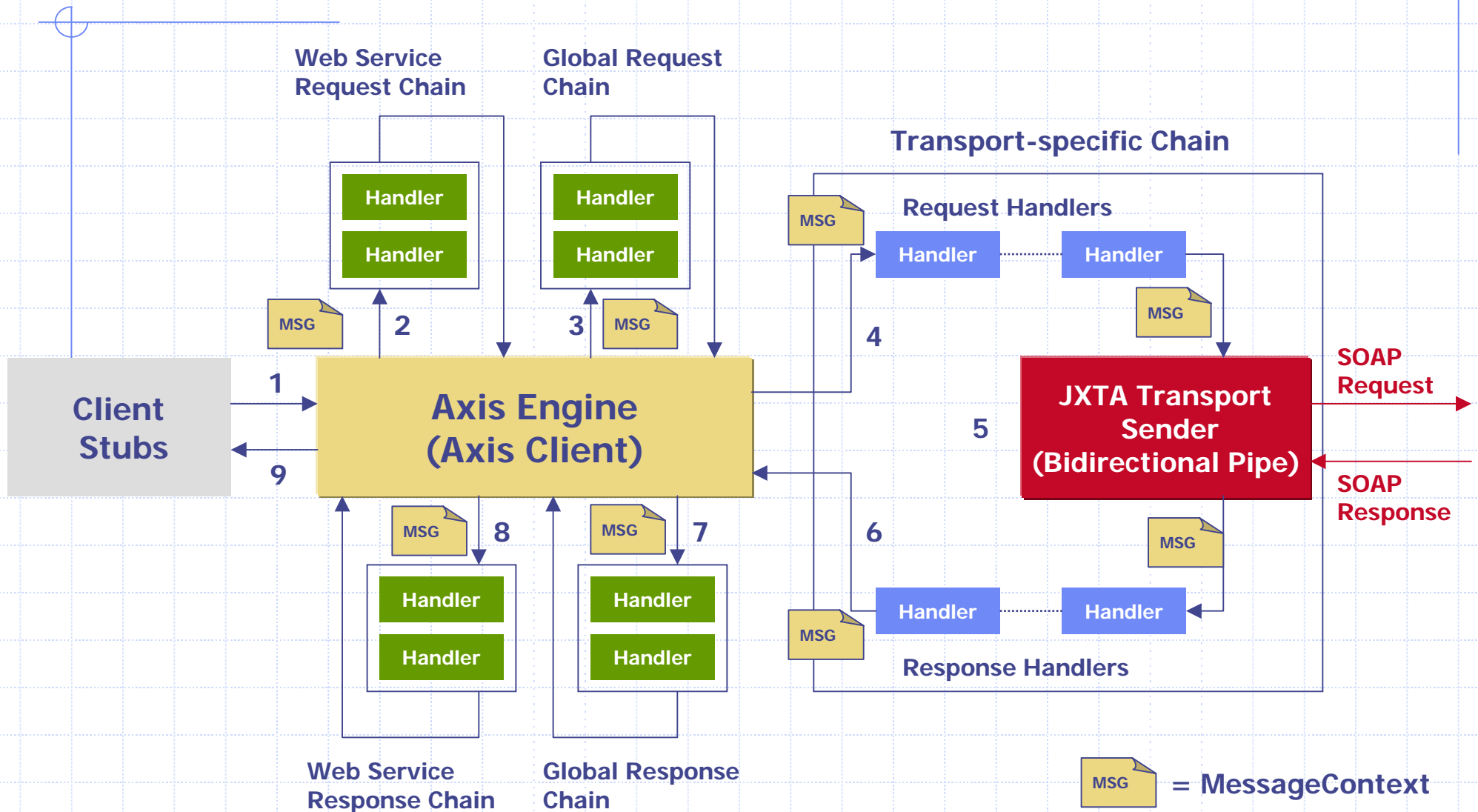
JSDL : JXTA Service Definition Language Changes to WSDL

```
<binding name="XXXXXXX" type=XXXX">
<soap:binding style="document"
  transport="http://schemas.xmlsoap.org/soap/JXTA"/>
    <operation name="GetLastTradePrice">
        <soap:operation
          soapAction="http://example.com/GetLastTradePrice"/>
        ......
    </operation>
</binding>
<service name="StockQuoteService">
  ......
    <port name="StockQuotePort"
      binding="tns:StockQuoteBinding">
        <soap:address
          location="http://example.com/stockquote.MSA"/>
    </port>
</service>
```
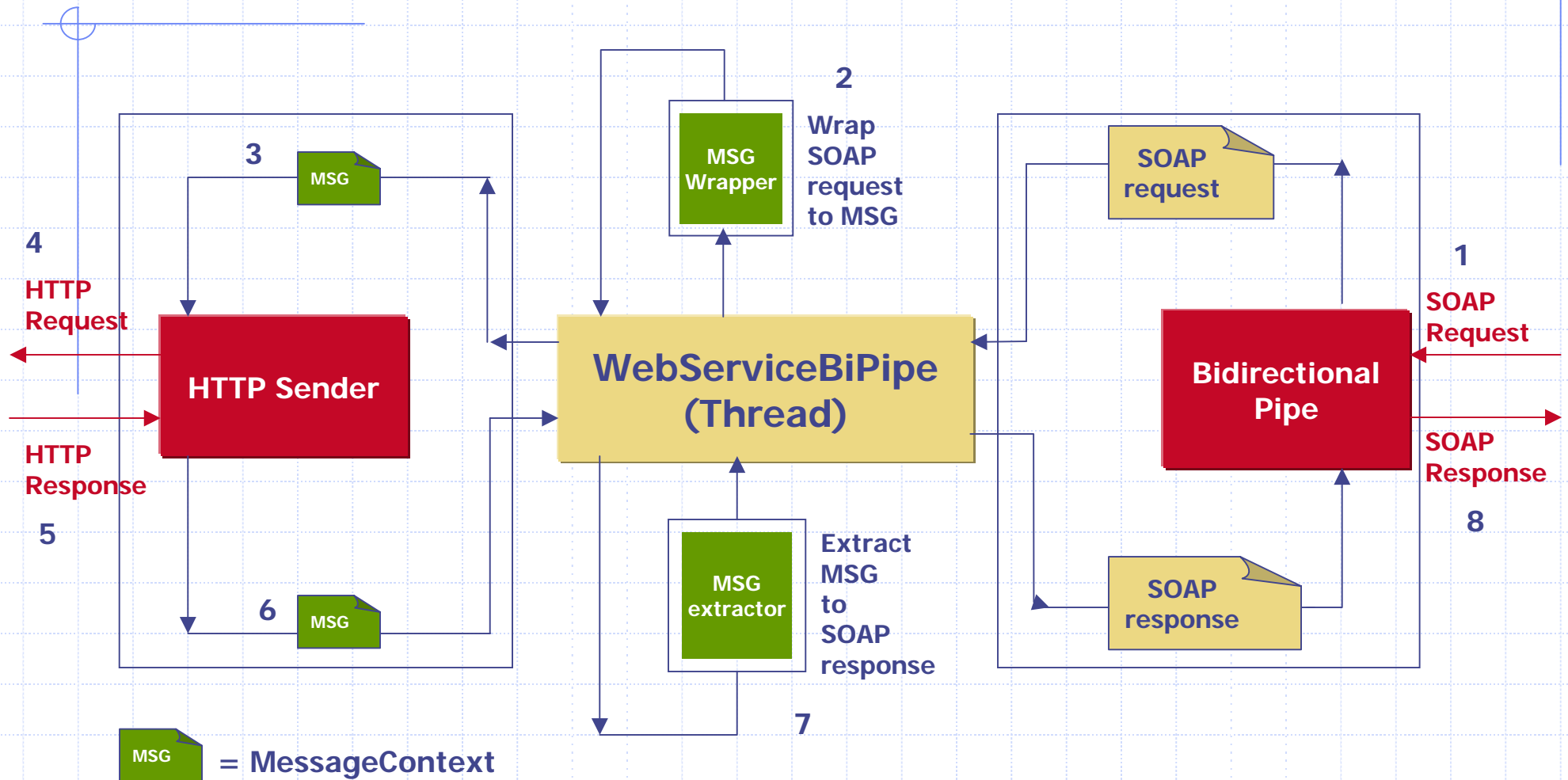
GOAL-1. JXTA2WebService

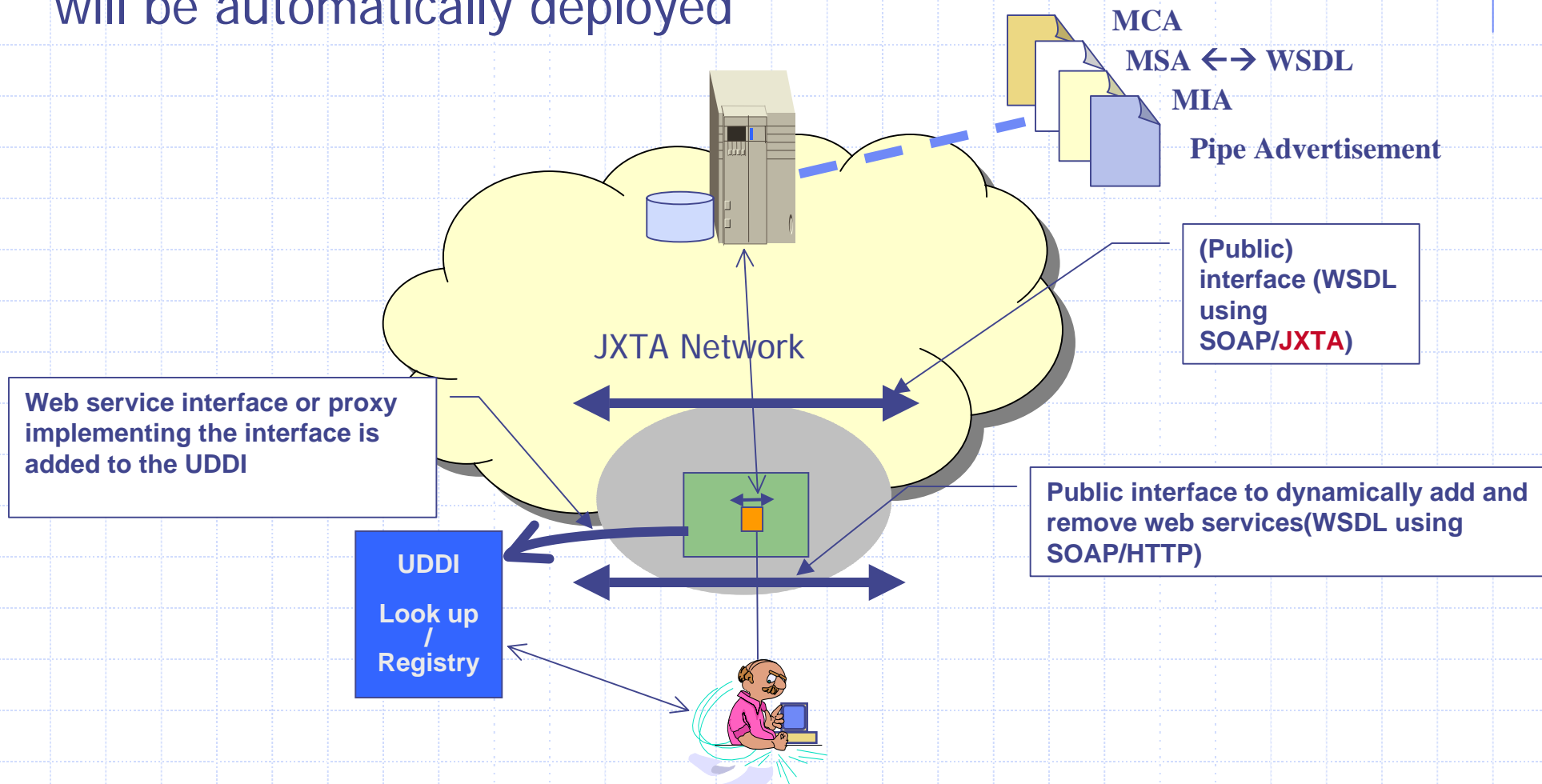◆ Give me a web service and its WSDL, A mirror JXTA service will be automatically deployed

MCA

MSA ←→ WSDL

MIA

Pipe Advertisement

JXTA Network

(Public) interface (WSDL using SOAP/**JXTA**)

Public interface to dynamically add and remove web services(WSDL using SOAP/HTTP)

WSDL

Web Service

JXTA2WebService – Client Side

Web Service Request Chain

Global Request Chain

Transport-specific Chain

Request Handlers

| Handler | Handler |

| Handler | Handler |

MSG

MSG

MSG

2

3

MSG

4

Client Stubs

1

Axis Engine (Axis Client)

JXTA Transport Sender (Bidirectional Pipe)

5

SOAP Request

9

SOAP Response

6

MSG

MSG

8

MSG

7

MSG

| Handler | Handler |

| Handler | Handler |

| Handler | Handler |

Response Handlers

Web Service Response Chain

Global Response Chain

MSG = MessageContext

JXTA2WebService – Gateway Side

MSG = MessageContext

Goal-2. WebService2JXTA

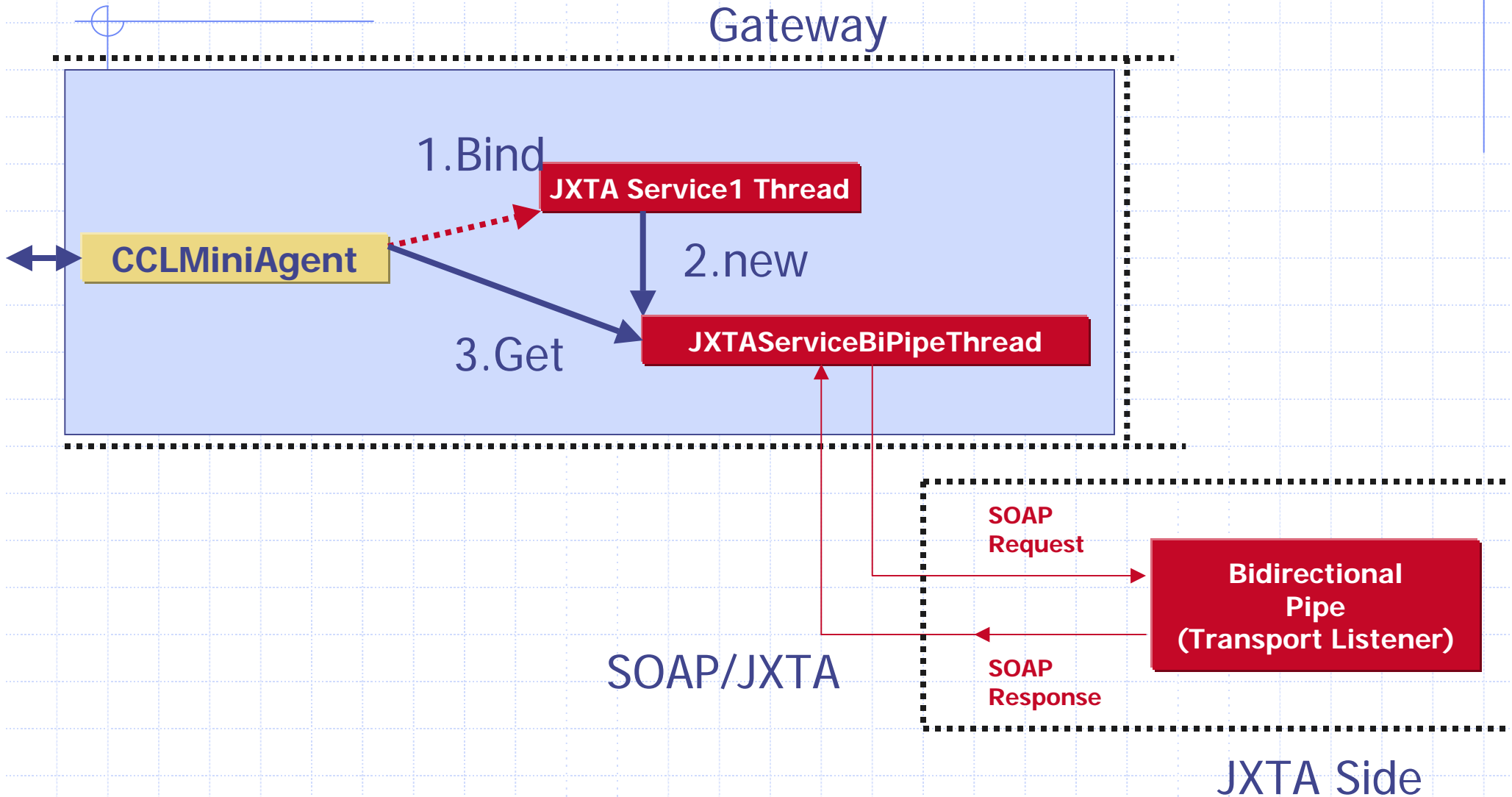◆ Give me a jxta service and its adv's, A mirror web service will be automatically deployed

MCA

MSA ←→ WSDL

MIA

Pipe Advertisement

(Public) interface (WSDL using SOAP/JXTA)

JXTA Network

Web service interface or proxy implementing the interface is added to the UDDI

Public interface to dynamically add and remove web services(WSDL using SOAP/HTTP)

UDDI

Look up / Registry

WebService2JXTA – Gateway Side

Gateway

Web Service Client

SOAP/HTTP

CCLMiniWebServer

new

CCLMiniAgent

CCLMiniAgent

......

CCLMiniAgent

JXTA Service1 Thread

Bind

......

......

JXTA Service3 Thread

Dispatch Control
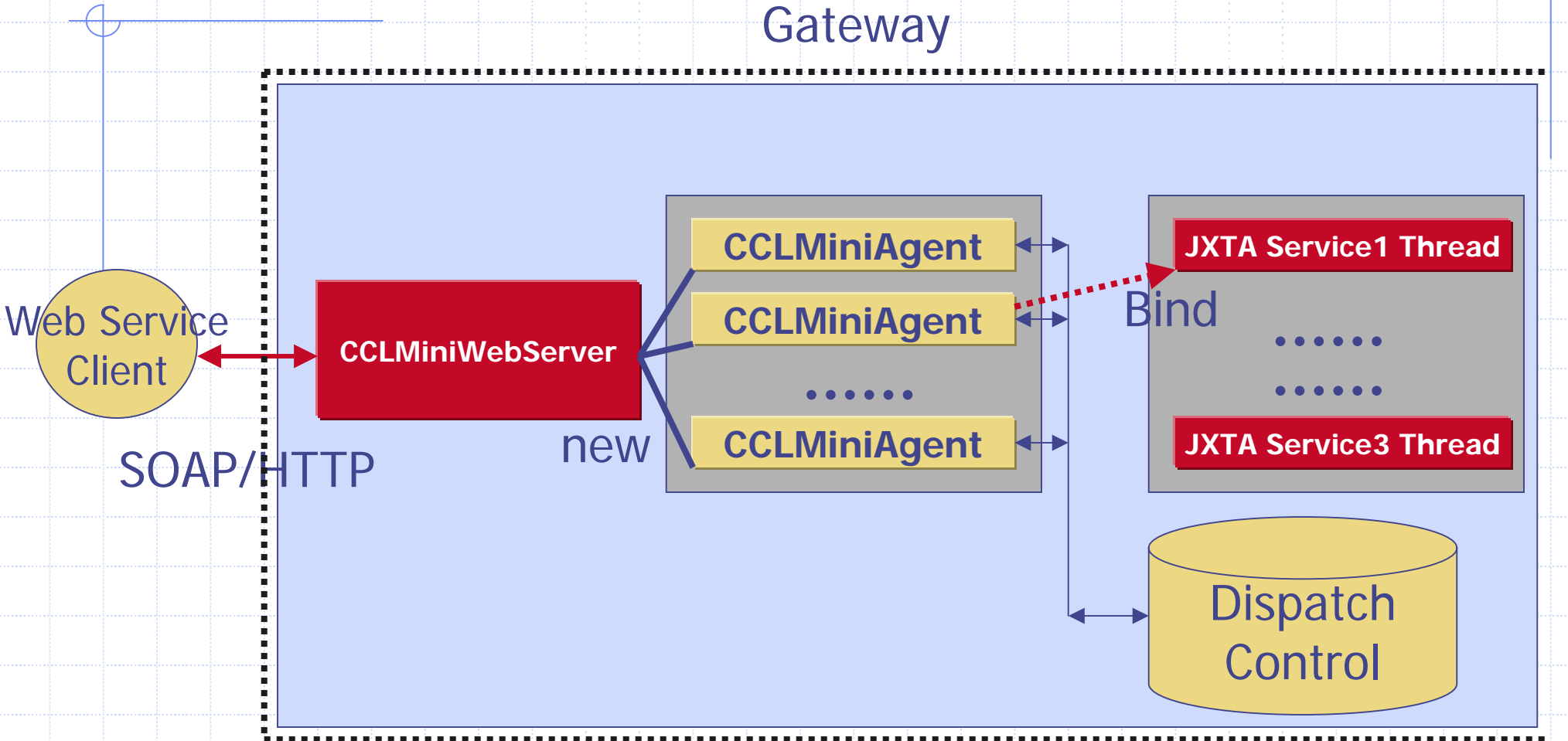
Mapping:
Target Service <->JXTA Service

WebService2JXTA – Gateway Side (cont.)

Gateway

1.Bind

JXTA Service1 Thread

CCLMiniAgent

2.new

3.Get

JXTAServiceBiPipeThread

SOAP
Request

SOAP/JXTA

SOAP
Response

**Bidirectional
Pipe
(Transport Listener)**

JXTA Side

WebService2JXTA – JXTA Side

3

MSG Wrapper

Wrap SOAP request to MSG

Request Queue

1

SOAP Request

2

MSG

Bidirectional Pipe (Transport Listener)

JxtaBiPipeServiceThread

4

MSG

SOAP Response

8

7

MSG

MSG

5

Result Map

MSG extractor

Extract MSG to SOAP response

6

MSG = JXTA Message

MSG = MessageContext

CCLAxisServer

WebService2JXTA – JXTA Side-cont.
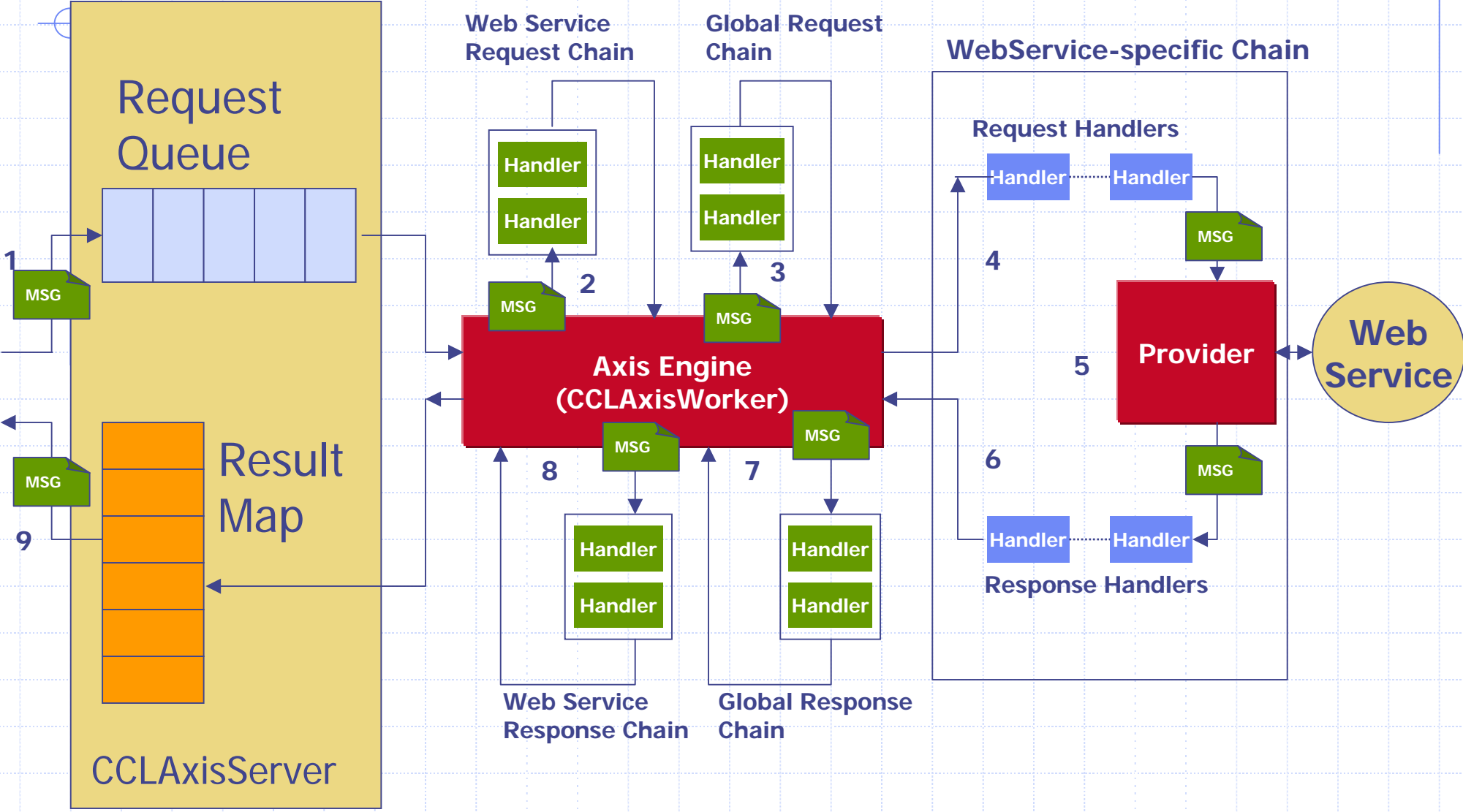
Reference :Apache Axis 1.0

Handler

Interaction Diagrams
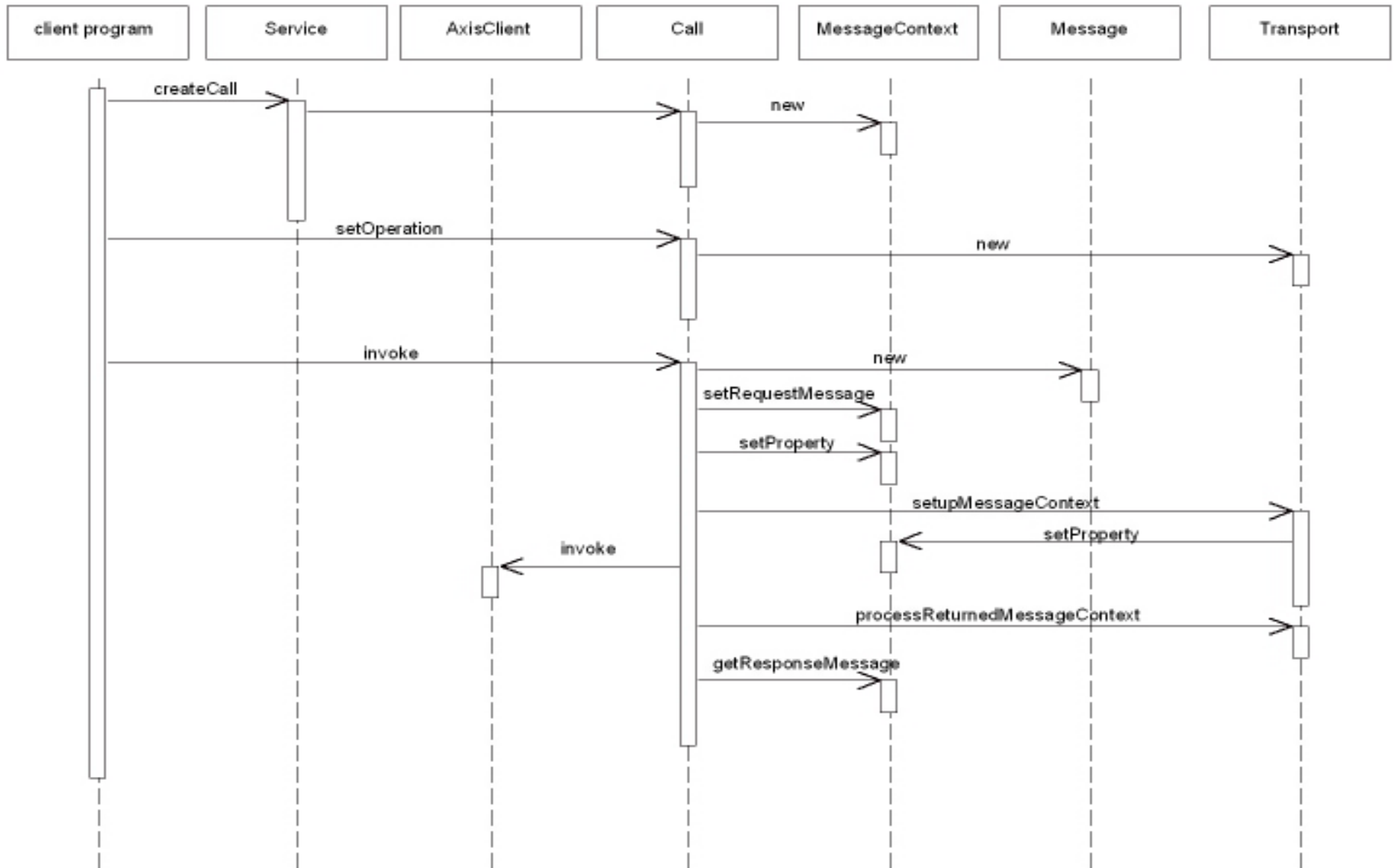
Web Service Gateway

Web Service Gateway
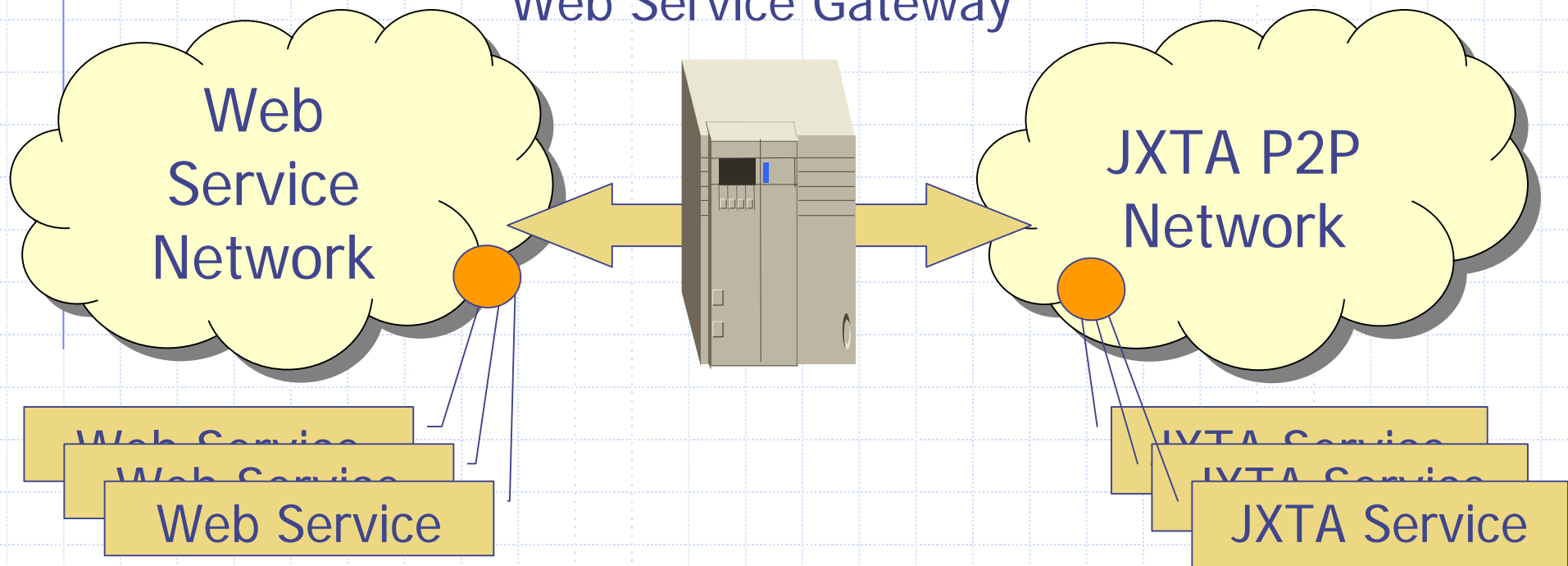
Web
Service
Network

JXTA P2P
Network

Web Service

Web Service

Web Service

JXTA Service

JXTA Service

JXTA Service

- WebService2JXTA
  - Client use Web Service Invocation to use JXTA Service.
  - => Web Service Client → gateway → JXTA Service
- JXTA2WebService
  - Client use JXTA Service Invocation to use Web Service.
  - => Web Service ← gateway ← JXTA Client

Web Service Gateway – cont.

◆ Target : Transparency between JXTA world and Web Service World.

- Proxy for Web Service & JXTA Service

- WebService2JXTA
  - Client use Web Service Invocation to use JXTA Service.
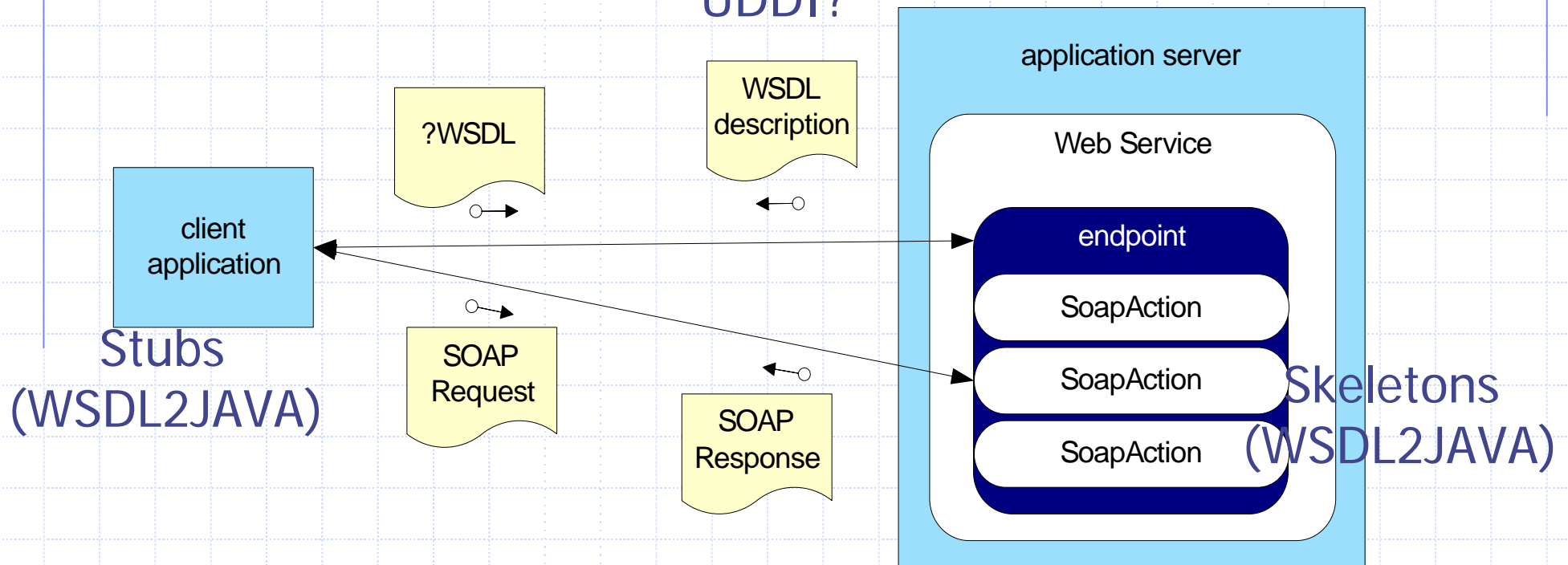   => Web Service Client → gateway → JXTA Service
- JXTA2WebService
  - Client use JXTA Service Invocation to use Web Service.
    => Web Service ← gateway ← JXTA Client

Web Services : WSDL

UDDI?

application server

?WSDL

WSDL description

Web Service

client application

endpoint

SoapAction

SoapAction

SoapAction

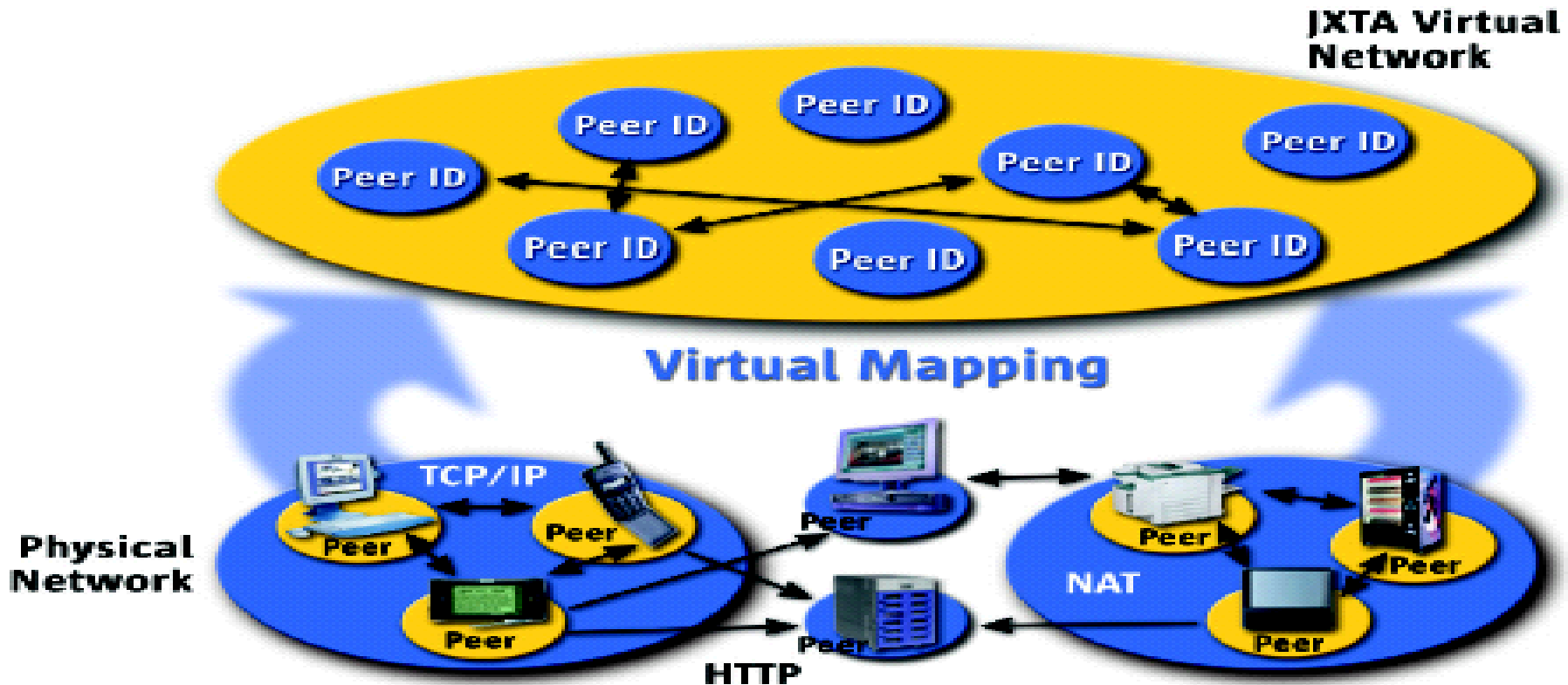Stubs (WSDL2JAVA)

SOAP Request

SOAP Response

Skeletons (WSDL2JAVA)

- *there is no point writing a Web Service unless you want interoperability.*
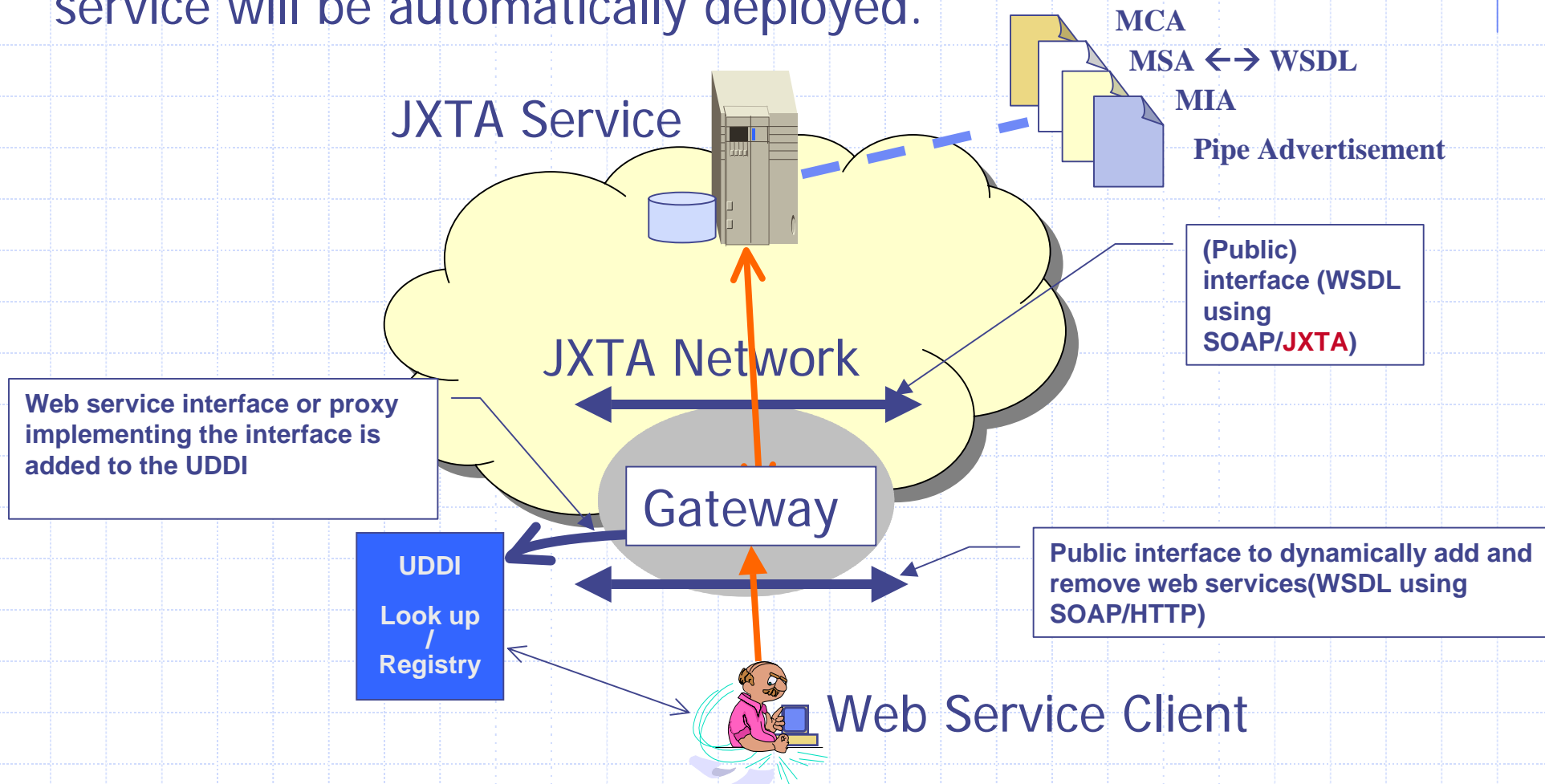
JXTA Service : JSDL

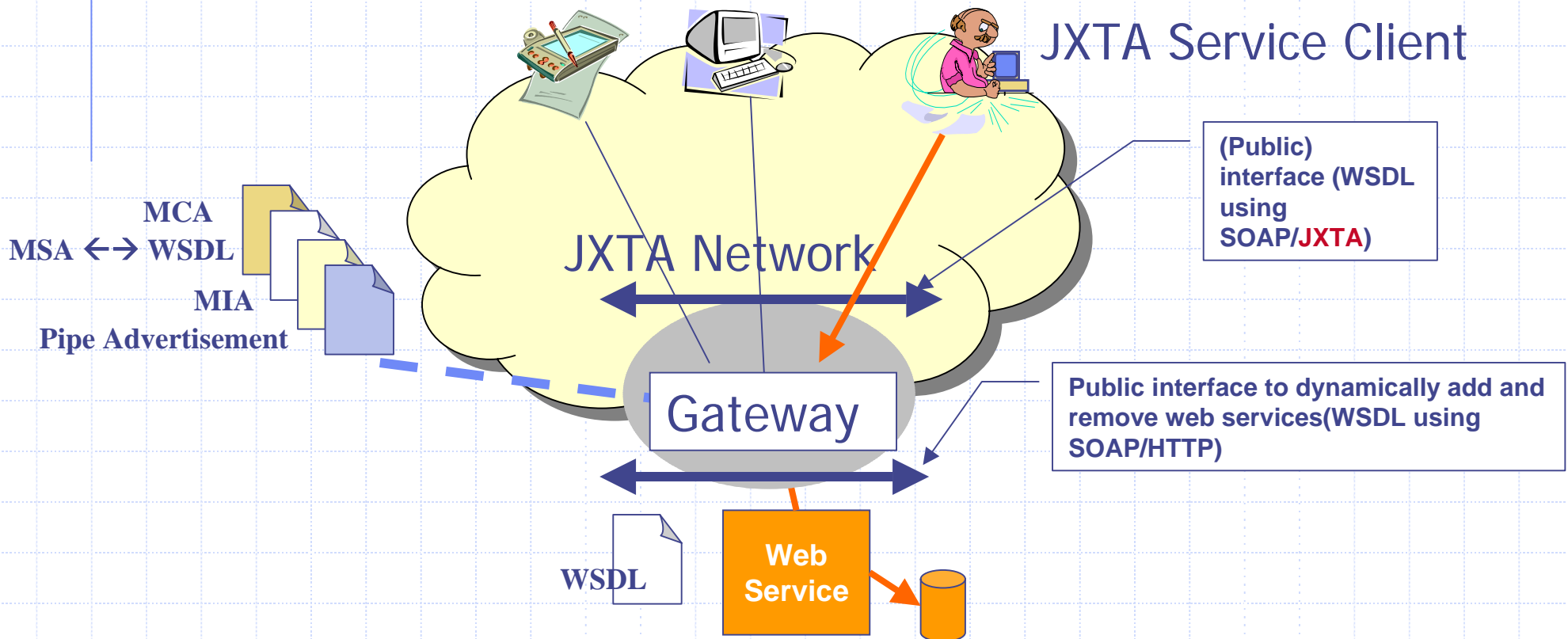◆ JXTA : a P2P platform to establish a virtual network over physical network.

Goal-1. WebService2JXTA

◆ Give me a JXTA service and its adv's, A mirror web service will be automatically deployed.

MCA

MSA ←→ WSDL

MIA

Pipe Advertisement

JXTA Service

JXTA Network

(Public) interface (WSDL using SOAP/**JXTA**)

Web service interface or proxy implementing the interface is added to the UDDI

Gateway

UDDI

Look up / Registry

Public interface to dynamically add and remove web services(WSDL using SOAP/HTTP)

Web Service Client

GOAL-2. JXTA2WebService

◆ Give me a web service and its WSDL, A mirror JXTA service will be automatically deployed

JXTA Service Client

MCA

MSA ←→ WSDL

MIA

Pipe Advertisement

JXTA Network

(Public) interface (WSDL using SOAP/**JXTA**)

Gateway

Public interface to dynamically add and remove web services(WSDL using SOAP/HTTP)

WSDL

Web Service

Web Service & JXTA Service tech:
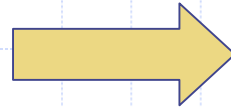
- ◆ Web Services :
  - ■ AXIS : follow-on to the Apache SOAP project.
  - ■ WSDL2JAVA Tool : stubs & skeletons
- ◆ JXTA Service:
  - ■ A P2P framework developed by Sun.
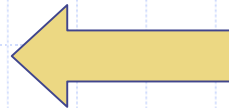 - ■ CCLWSDL2JAVA Tool : stubs with JXTA Transport Handler. (SOAP/JXTA)

Tech on Gateway :

- ◆ WebService2JXTA:
  - ■ MiniWebServer - select correct JXTA Service proxy implementation for incoming Web Service request.
  - ■ A simple multi-thread design in JXTA Service proxy implementation.
- ◆ JXTA2WebService:
  - ■ Deployment Tool for Web Service proxy – publish JXTA advertisement and lunch proxy implementation.
  - ■ HttpSoapHandler – Send SOAP request and receive SOAP response for Web Service Invocation.

Tech on service & client side:

◆ JXTA client :

- CCLWSDL2JAVA Tool – generate Web Service stubs with JXTA Transport Handler. (SOAP/JXTA)

◆ JXTA Service side :

- CCLAxisServer – handle Web Service Invocation for JXTA Service.

  (Type convention between XML<-> Java)
- Deployment Tool for JXTA Service proxy

Demo scenario :

◆ WebService2JXTA

- Adv : Service deployment leverages JXTA network advantage.

    - Secure : Peer Group Scope

    - JXTA Service can be deployed on different peers in JXTA virtual network.

    - User quantity

Web Service Client   →   SOAP/HTTP   →   Gateway   →   SOAP/JXTA   →   JXTA network   JXTA Server