Automating SLA negotiation: a policy-based approach

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Presentation Outline

- The FORM project environment
- Current policy issues
- Towards a generic policy model
- Automating SLA negotiation
  - The SLA negotiation process
  - A SLA negotiation engine
  - SLA negotiation policies
- Technical issues
- Further work

FORM

FORM: Main Goal and Approach

GOAL

To enable FORM's industrial partners to exploit services, software systems and software components for the management of an outsourced Inter-Enterprise Service (IES) supporting B2B communication requirements

Approach

Definition of an Open Development Framework addressing operational needs for IES management and development of management systems based on software components (Building Blocks)

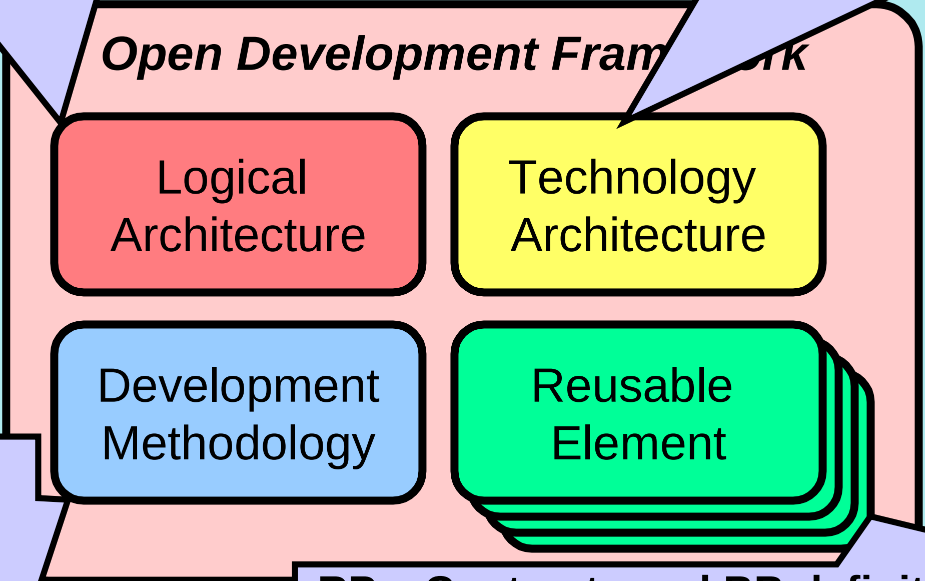
FORM: Anatomy of an Open Development Framework

Business Roles + RPs (TINA)
Business Processes (TMF)
BBs in 3 tiers
BB platform services
BB contracts

Map BB to specific technologies:

- BBs to EJB
- BB platform to container services
- Contract specs to interface implementation (IDL, HTTP/XML..)

Mediation - multi-protocol BBs

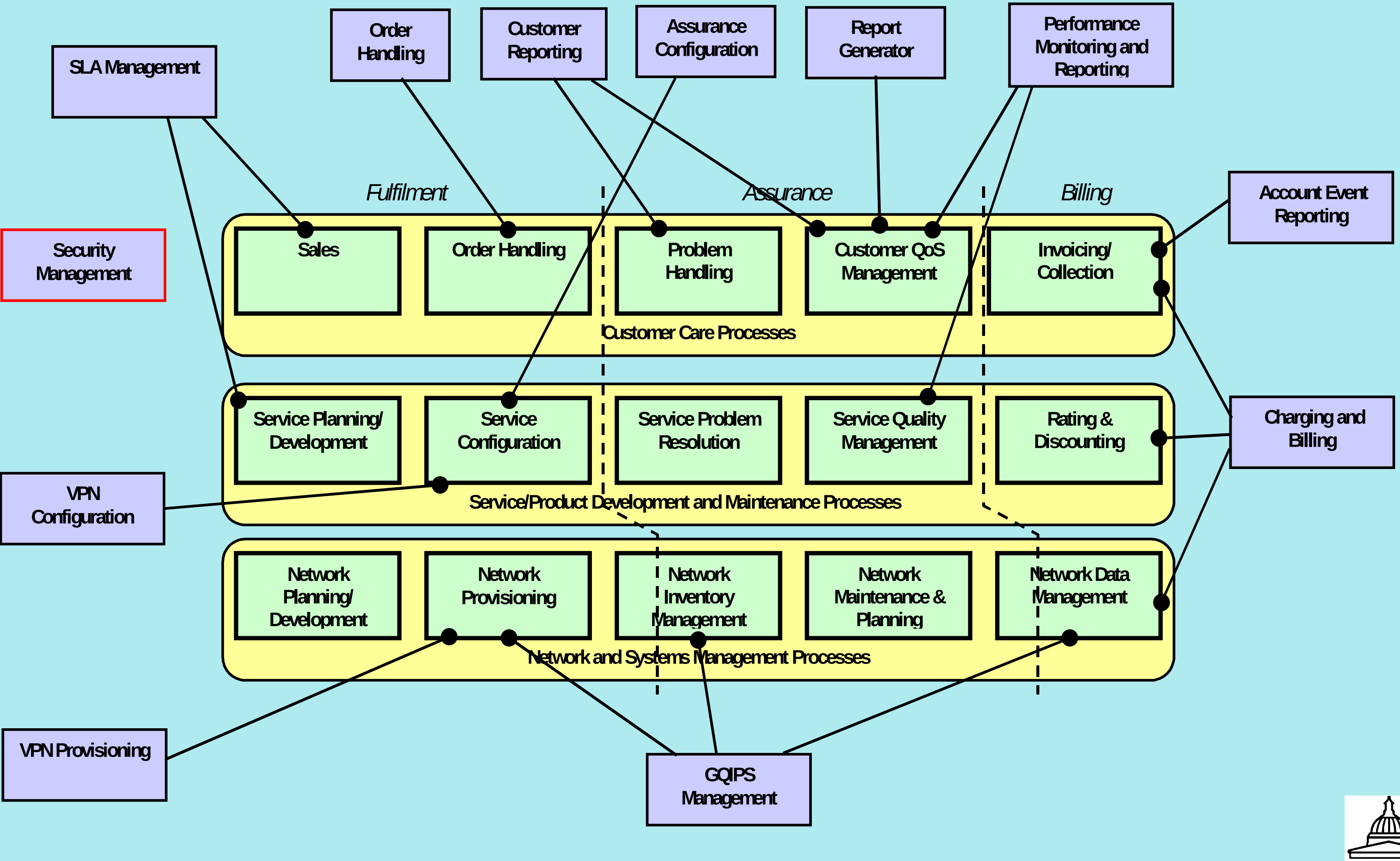


Business models
Business process
OOAD
Contract/BB definition
RUP
Notation:
UML + XML?

RPs, Contracts and BB definitions:

- Bindings
- Implementation independent specs
- Packaged with analysis and design info
- Variability and Constraint specs

FORM: Mapping to TM Forum Business Processes



Policies

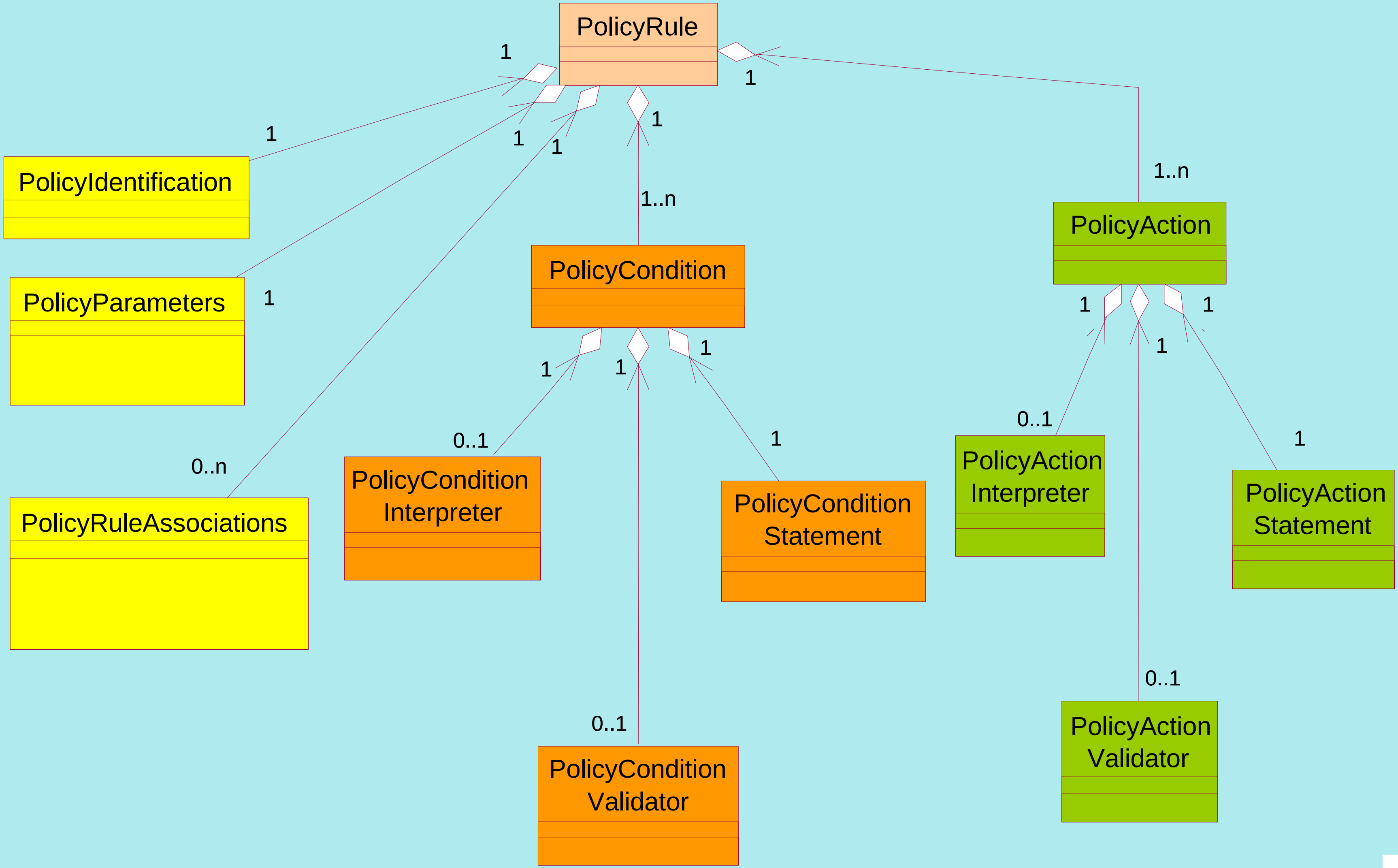
Background

- TMF SLA Group
- Imperial College work
  - Ponder language
- DMTF: PCIM and CIM
- IETF
- IST project Tequila
- Other IST projects (CADENUS, AQUILA, etc)
- Active Networks

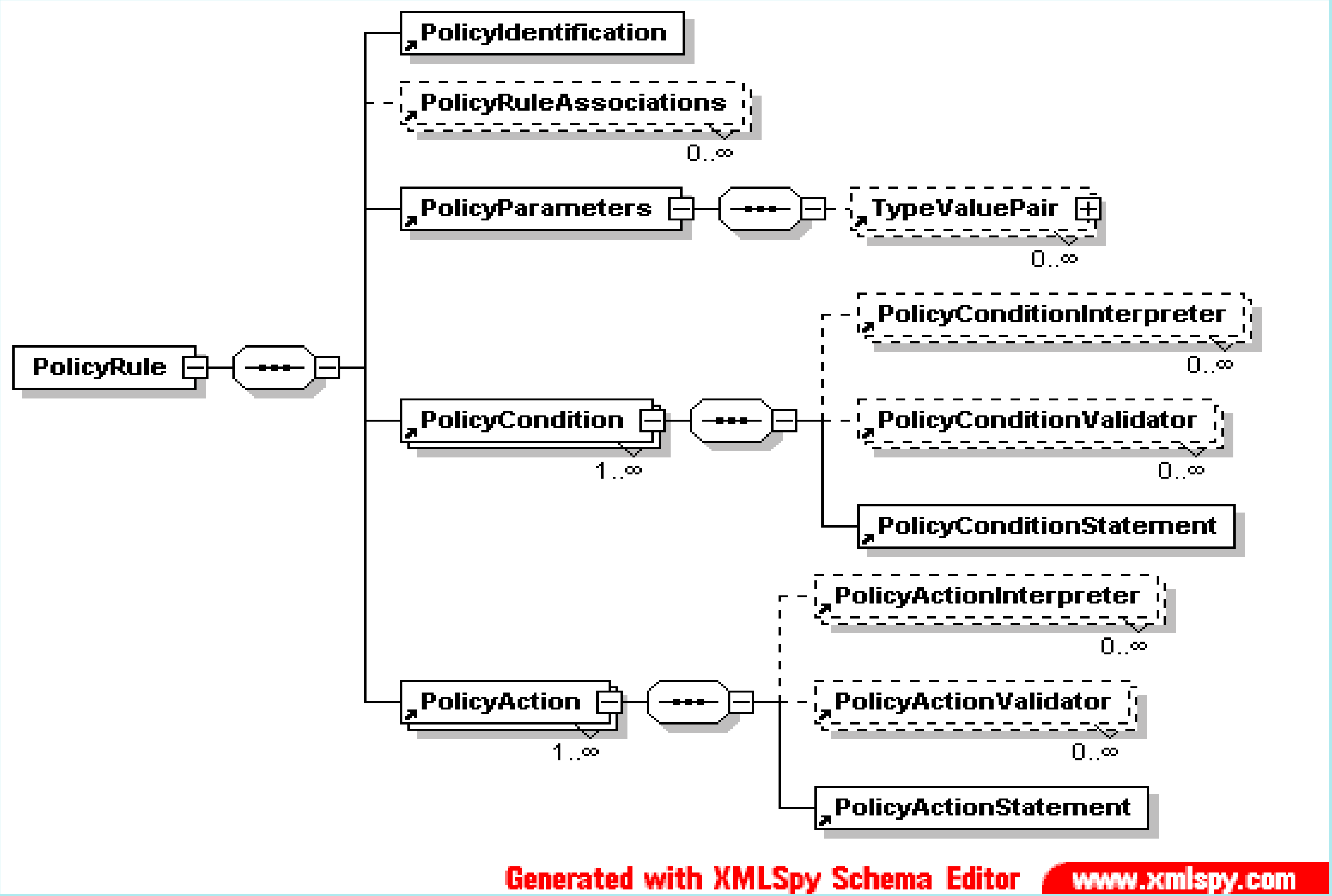
Policy Issues

- Are policies useful? Why?
- What functionality can be policy-based?
- Generic policy language
- O-O Policies
- Hierarchical policy organisation
- Transformation from high to low level policies
- Transformation from low to high level policies
- Policy meta-model
- Policy semantics
- Security concerns

Generic Policy Model (GPM)



polML: Generic Policy Model DTD



GPM Features

- Meta-model
- Policy language independent
- Applies to different application areas
- Provides for hierarchical policy organisation
- Provides for policy transformation functions
- Policy semantics are out of the model
- Security information can be added
- Compatible with current IETF/DMTF policy models
- A base for the implementation of policy-independent PDP/PEPs
- Separation between PDP/PEP infrastructure and policy specification, interpretation and enforcement

Relating the GPM to the DMTF/IETF Policies

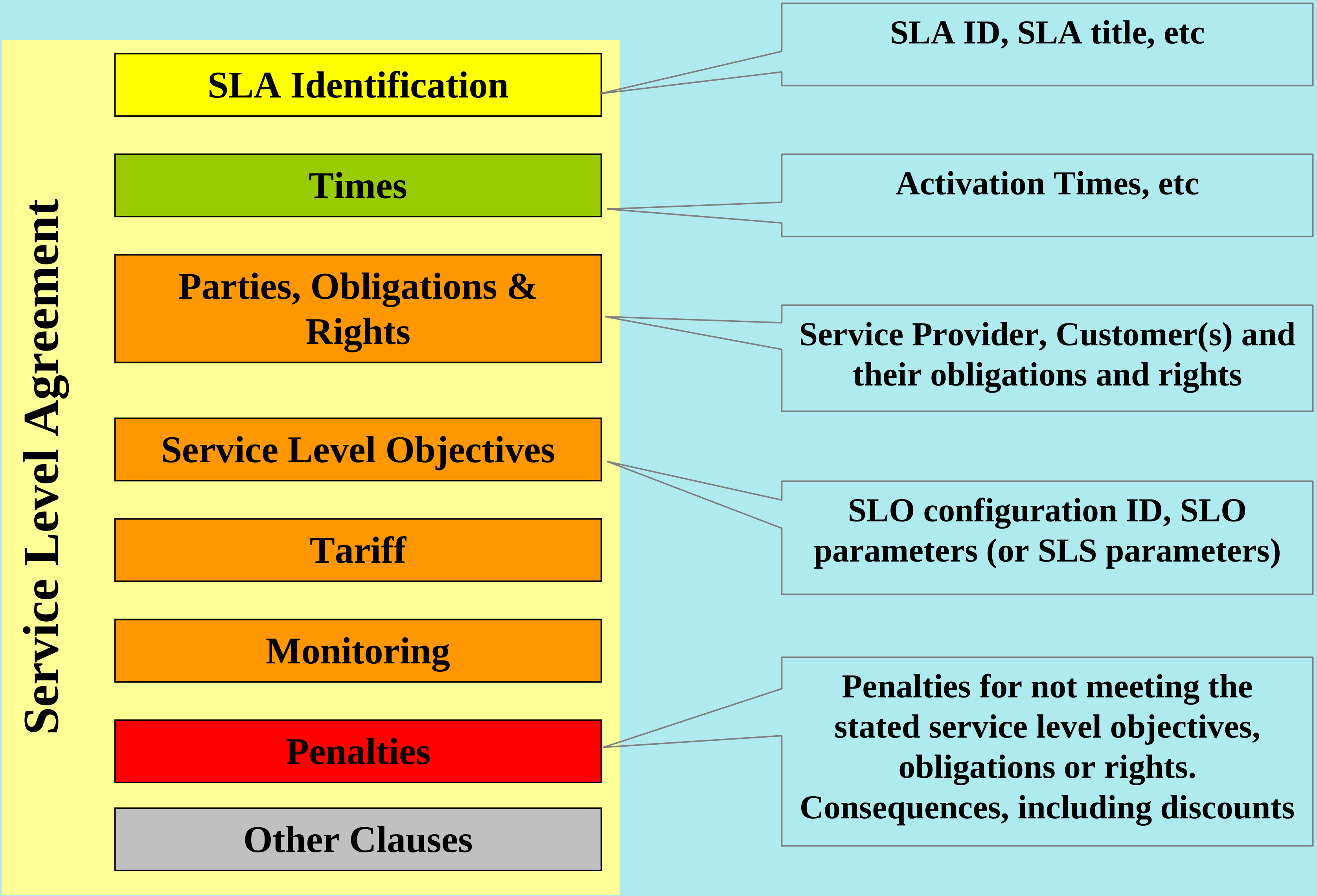
- Policy Identification
  - Rule usage description
- Policy Parameters
  - Enabled, priority, mandatory, condition list type, sequenced action, policy roles
- Policy Rule Associations
  - Policy roles?
- Policy Condition(s)
  - Policy condition(s), time period
- Policy Action(s)
  - Policy action(s)

FORM: Areas of Policy Use

- Automating the SLA negotiation process
- Generalising use of policies for controlling BB behaviour in general
- Policy-based SLS negotiation
- Policy-based network configuration and monitoring (assurance)
- Policy-based configuration of the IPSEC tunnel

SLA Negotiation

Structure of a SLA



Service Level Agreement

SLA Identification

Times

Parties, Obligations & Rights

Service Level Objectives

Tariff

Monitoring

Penalties

Other Clauses

SLA ID, SLA title, etc

Activation Times, etc

Service Provider, Customer(s) and their obligations and rights

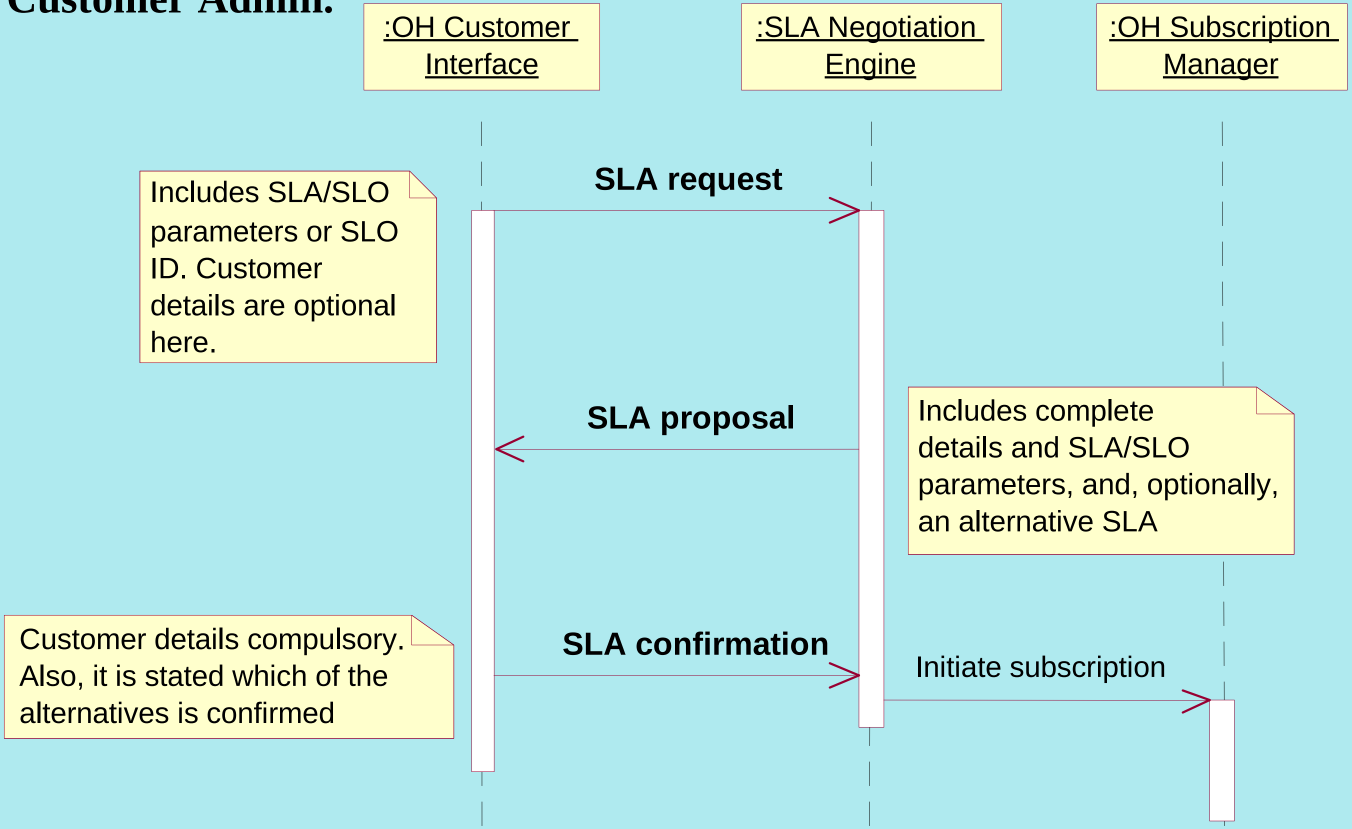
SLO configuration ID, SLO parameters (or SLS parameters)

Penalties for not meeting the stated service level objectives, obligations or rights.
Consequences, including discounts

SLA Negotiation Process

Customer Admin.

Service Provider Admin.



:OH Customer Interface

:SLA Negotiation Engine

:OH Subscription Manager

Includes SLA/SLO parameters or SLO ID. Customer details are optional here.

SLA request

SLA proposal

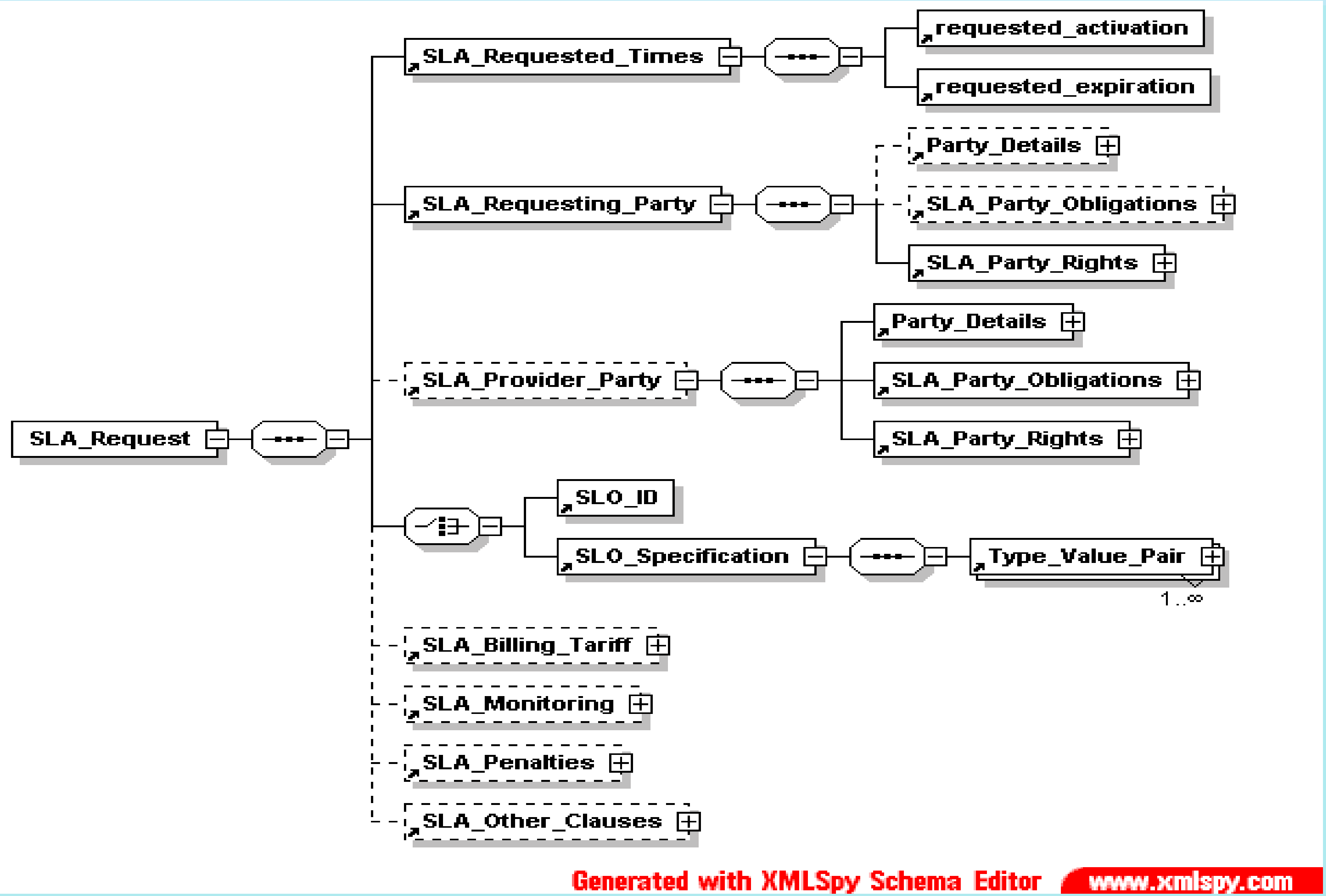
Includes complete details and SLA/SLO parameters, and, optionally, an alternative SLA

Customer details compulsory. Also, it is stated which of the alternatives is confirmed

SLA confirmation

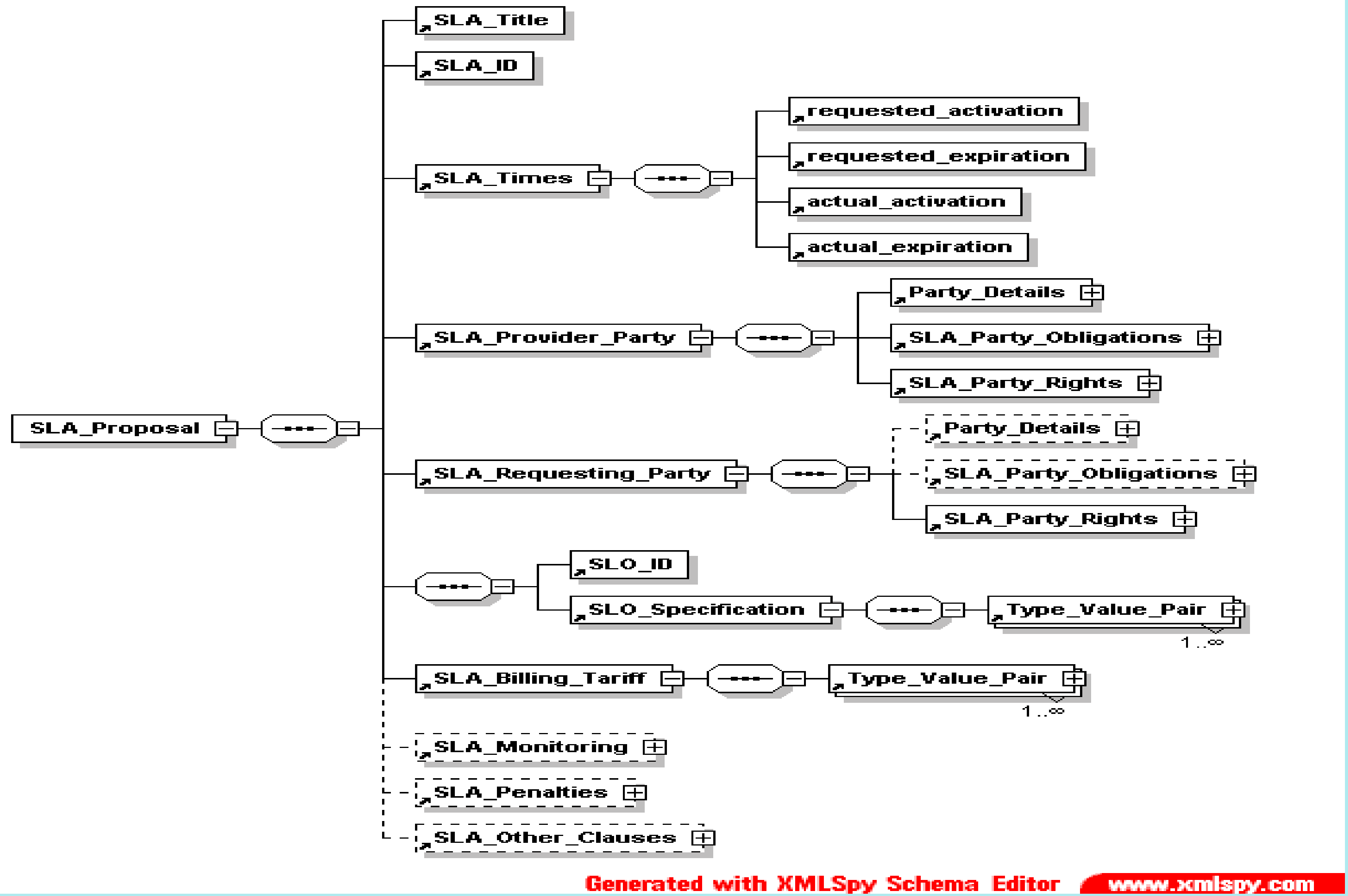
Initiate subscription

slaML: SLA Negotiation Request

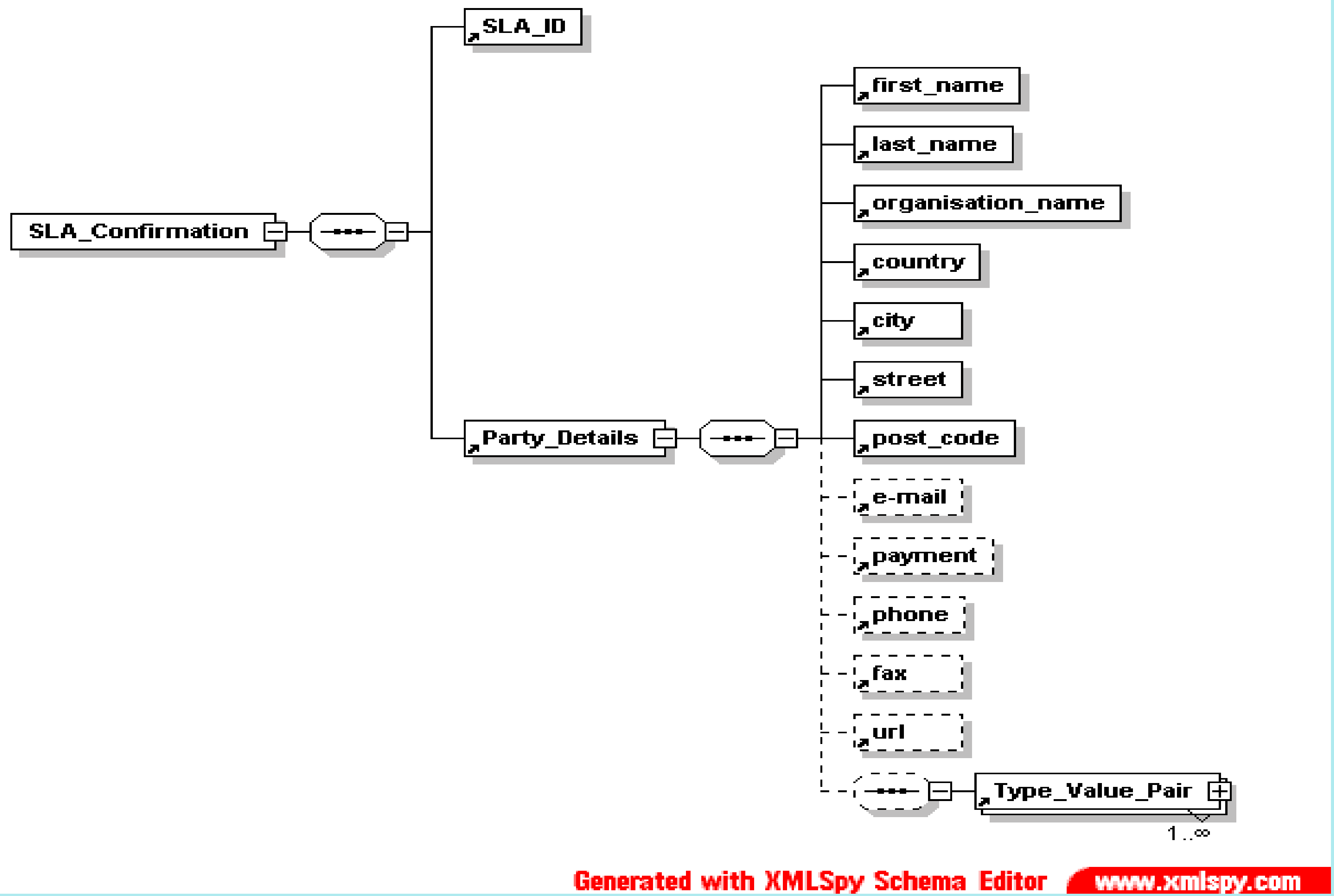


- SLA_Request
  - SLA_Requested_Times
    - requested_activation
    - requested_expiration
  - SLA_Requesting_Party
    - Party_Details
    - SLA_Party_Obligations
    - SLA_Party_Rights
  - SLA_Provider_Party
    - Party_Details
    - SLA_Party_Obligations
    - SLA_Party_Rights
  - SLO_ID
  - SLO_Specification
    - Type_Value_Pair 1..∞
  - SLA_Billing_Tariff
  - SLA_Monitoring
  - SLA_Penalties
  - SLA_Other_Clauses

slaML: SLA Proposal



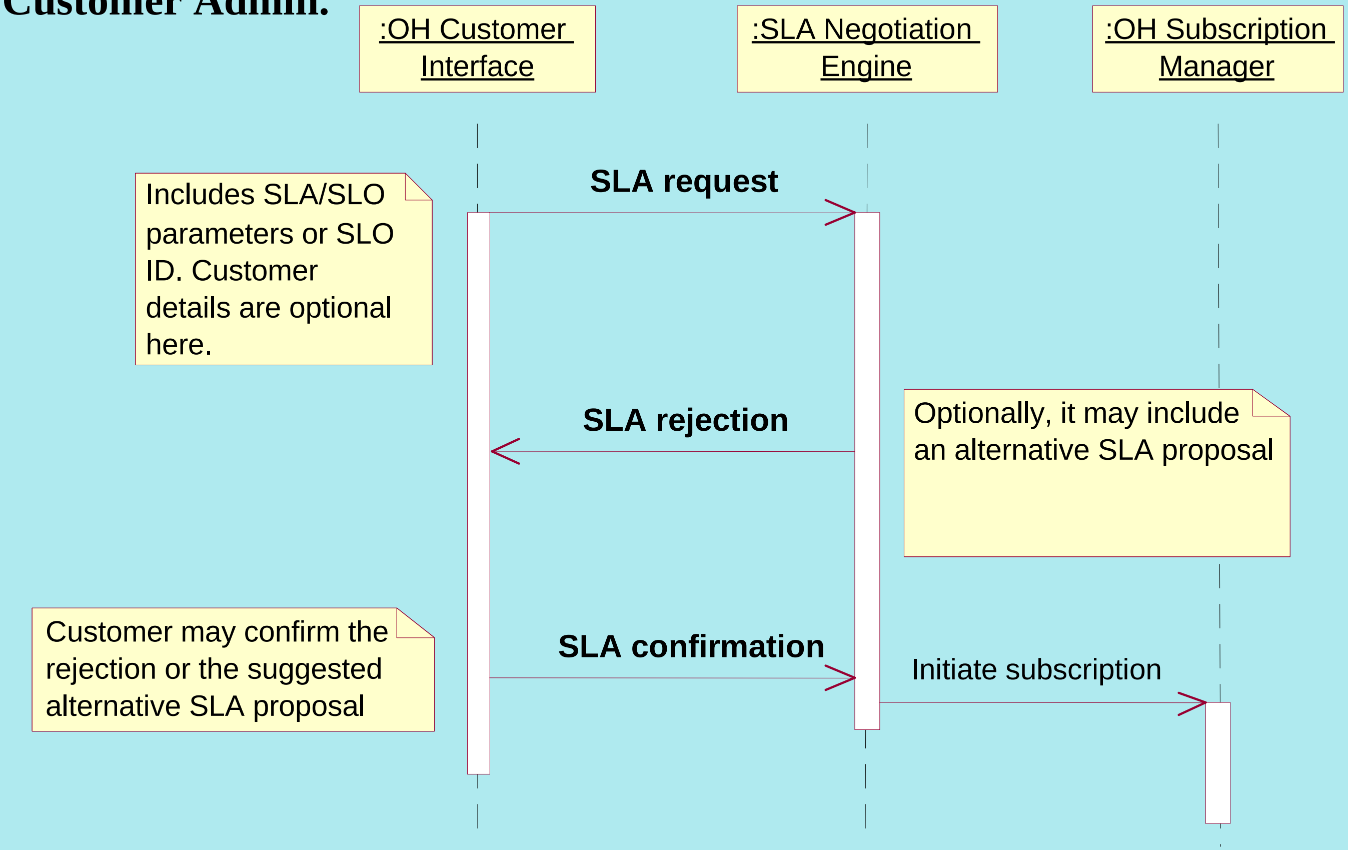
slaML: SLA Confirmation



SLA Negotiation Process (2)

Customer Admin.

Service Provider Admin.



:OH Customer Interface

:SLA Negotiation Engine

:OH Subscription Manager

Includes SLA/SLO parameters or SLO ID. Customer details are optional here.

SLA request

SLA rejection

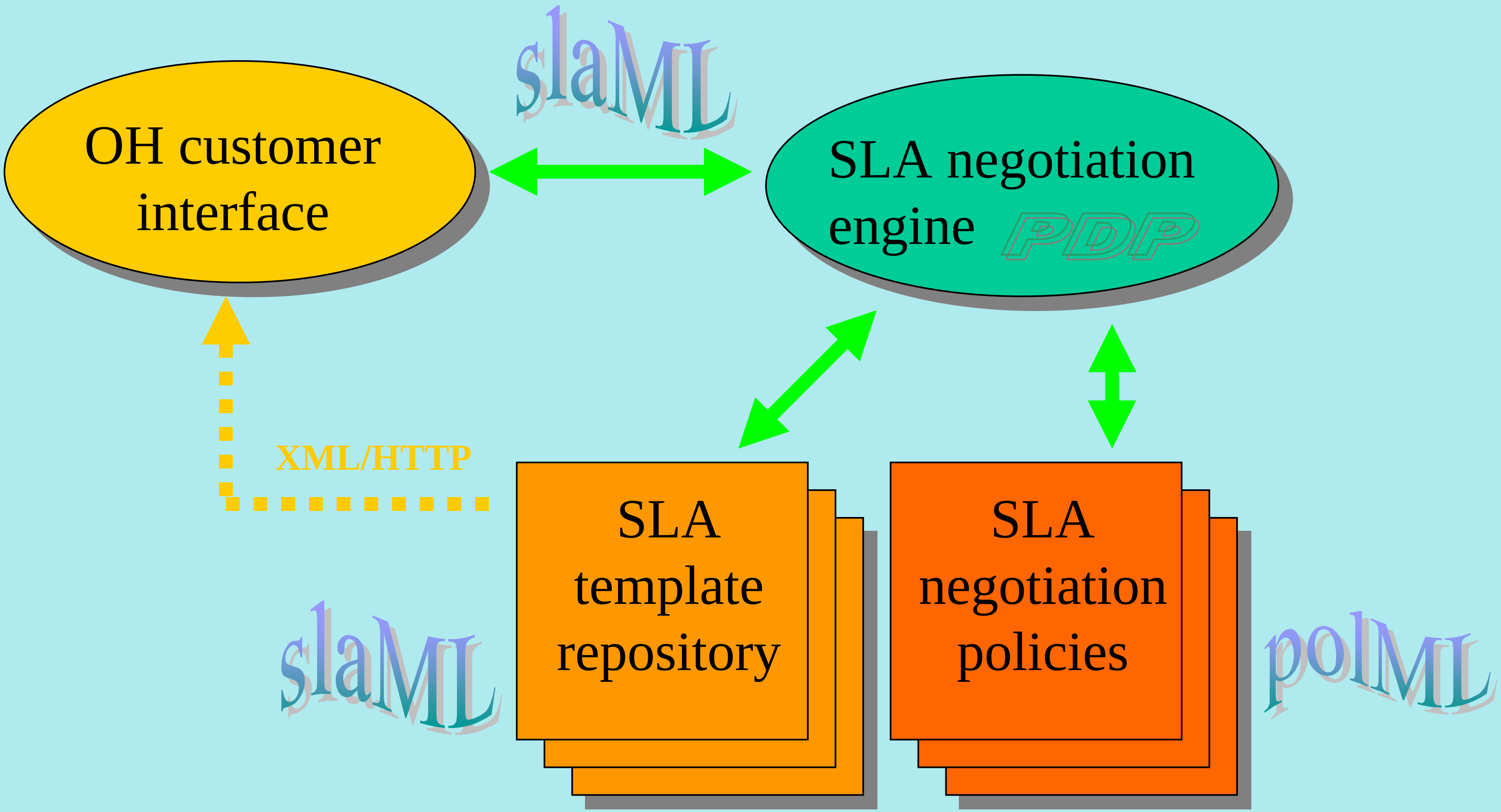
Optionally, it may include an alternative SLA proposal

Customer may confirm the rejection or the suggested alternative SLA proposal

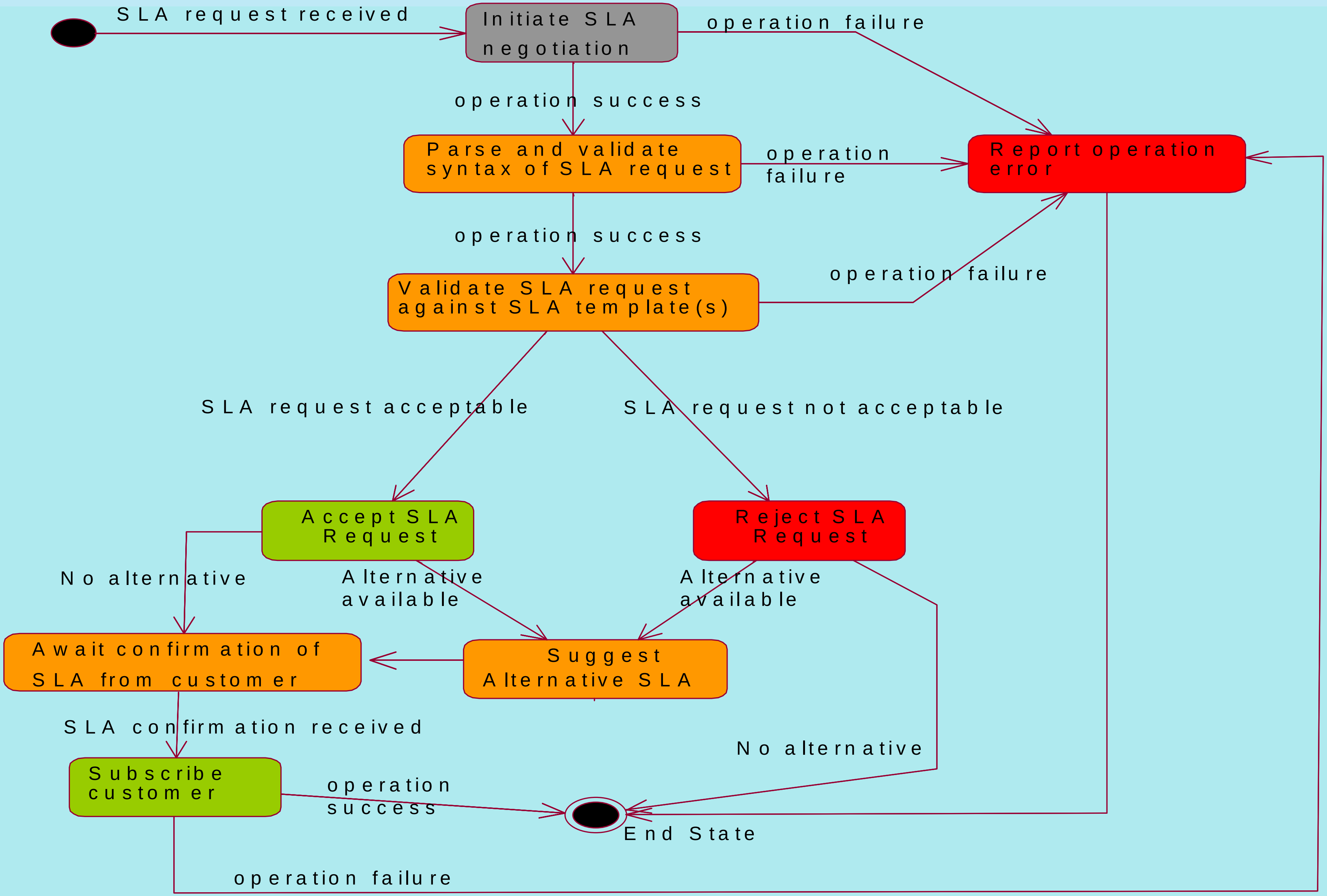
SLA confirmation

Initiate subscription

Main SLA Negotiation Components



Operation of the Negotiation Engine



SLA Negotiation Policy Examples

- SLA Negotiation Policies
  - If *SLASuccessfullyProccessed* then (*AcceptSLA, ConcludeSLANegotiation)*
  - If *SLANegotiationConcluding* then *CheckForAlternativeSLA*
  - If *SLOParameterRejected(bw)* then *CreateAlternativeSLA(bw, 2Mbps)*
- SLO Processing Policies
  - If *SLOParameter(bw) >= 2Mbps* then *RejectSLOParameter(bw)*

Technology Issues

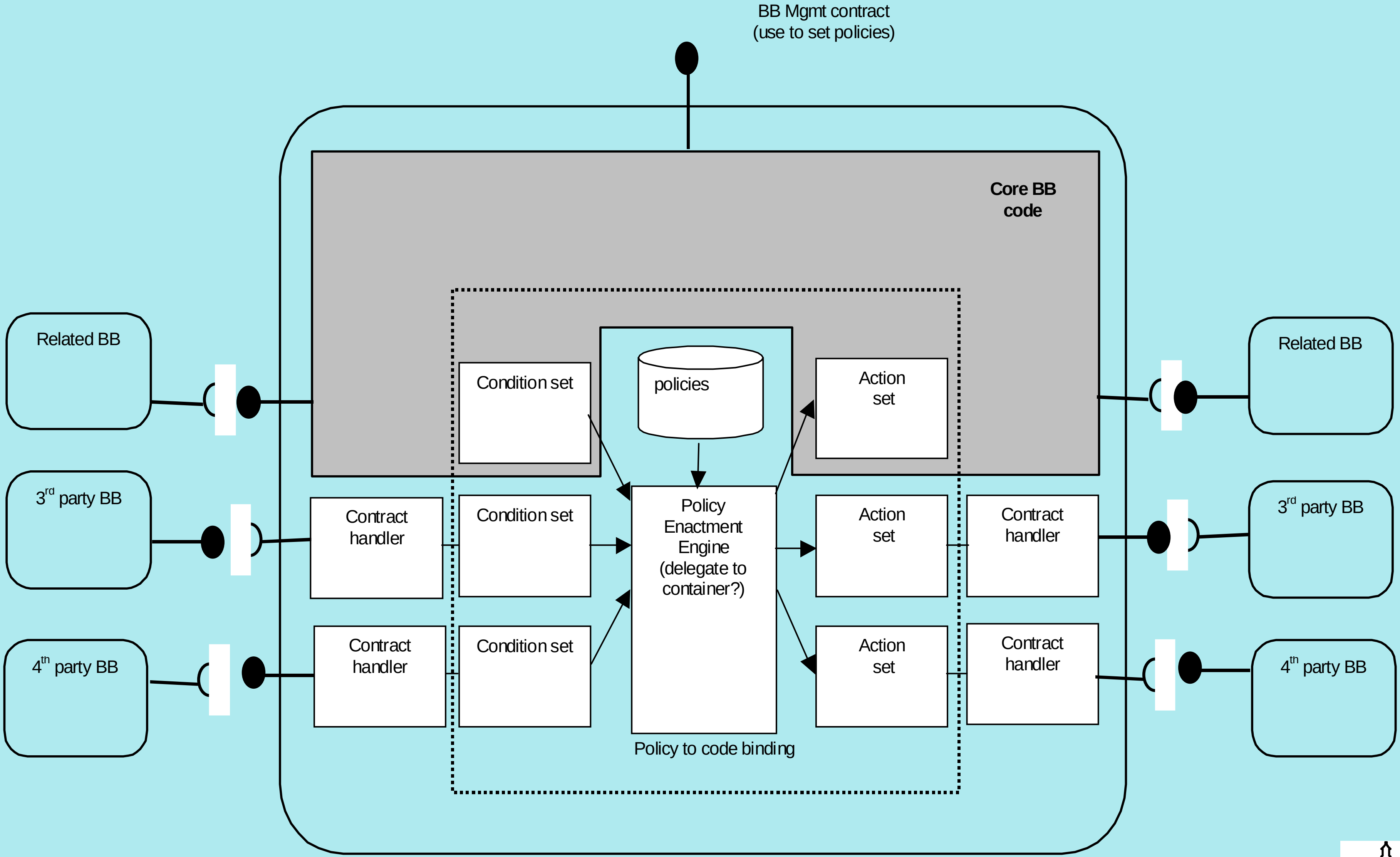
- XML for policy specification
  - Portable policies
  - Human readable policies
  - Interoperability with applications/databases
  - Definition of meta-policies as DTDs
  - Efficient policy processing, presentation and transformation (XPath, XSLT)
  - No O-O
  - Semantics?
- XML over HTTP for SLA negotiation
  - Efficient negotiation using a web browser, bypassing firewalls
  - SLA in human-readable form

Open Issues and Further Work

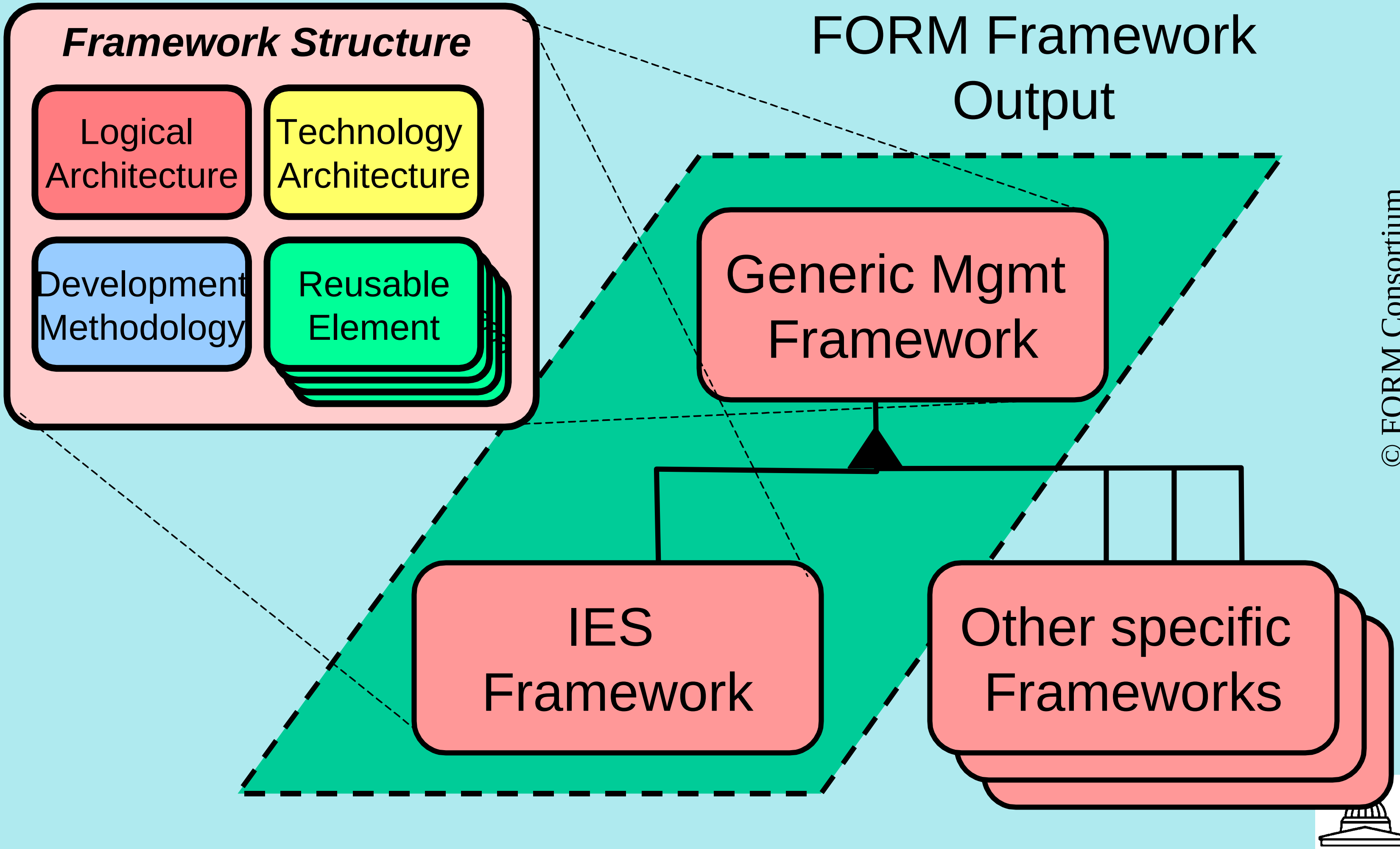
- Work on a policy specification language, parsing and enforcement components
- Develop a generic PDP/PEP based on the Generic Policy Model
- Develop a SLA policy negotiation engine based on the generic PDP/PEP engine
- Provide a policy transformation function for specific SLA policies
- IETF/DMTF policy parsers and enforcers
- Investigate using a generic PDP/PEP for IETF/DMTF policy processing
- Address security concerns

Backup Slides

Policy-based BB behaviour



FORM: Scope of the Open Development Framework



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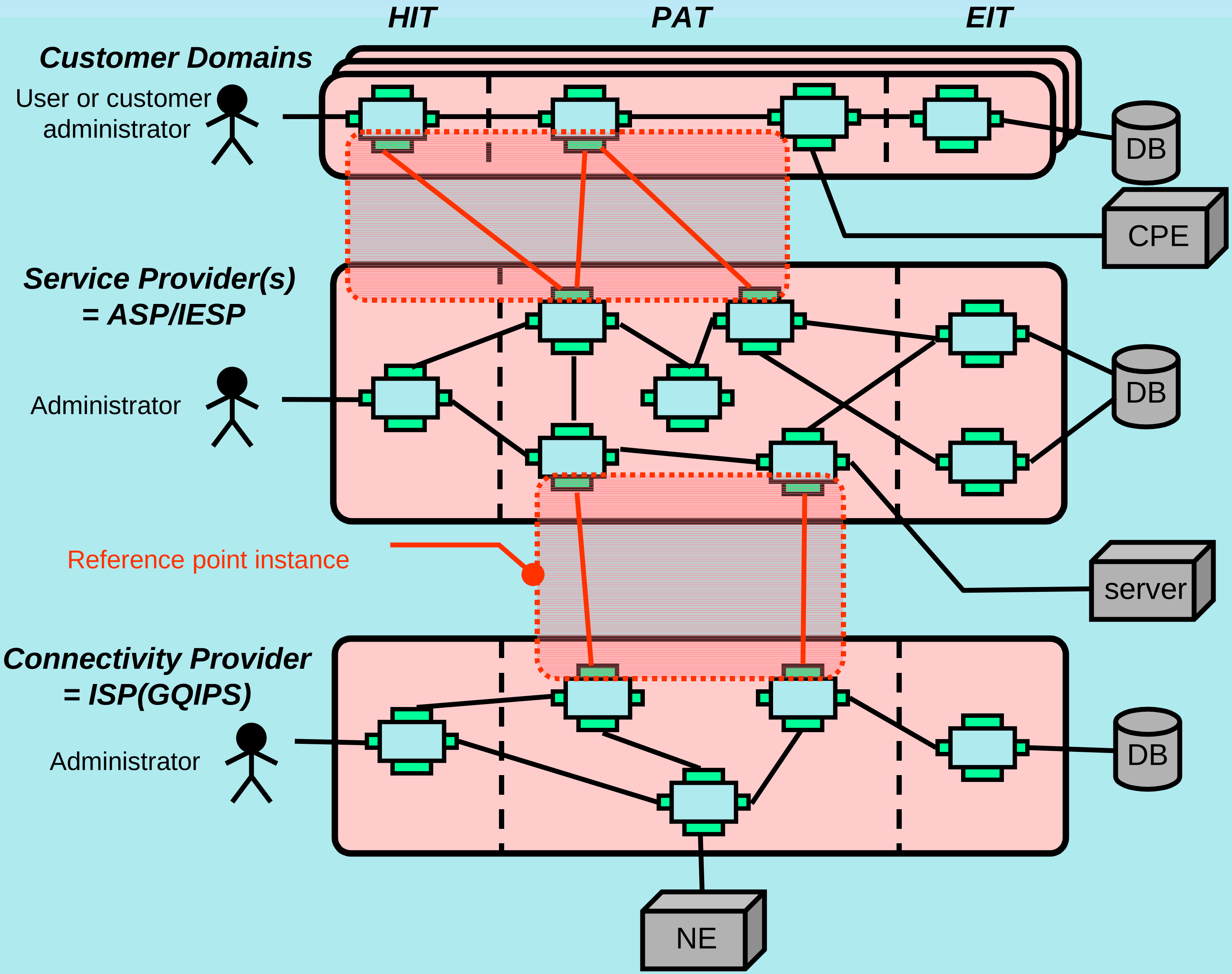
Architecture Bindings


HIT
PAT
EIT
Customer Domains
User or customer administrator
DB
CPE
Service Provider(s) = ASP/IESP
Administrator
DB
Reference point instance
server
Connectivity Provider = ISP(GQIPS)
Administrator
DB
NE

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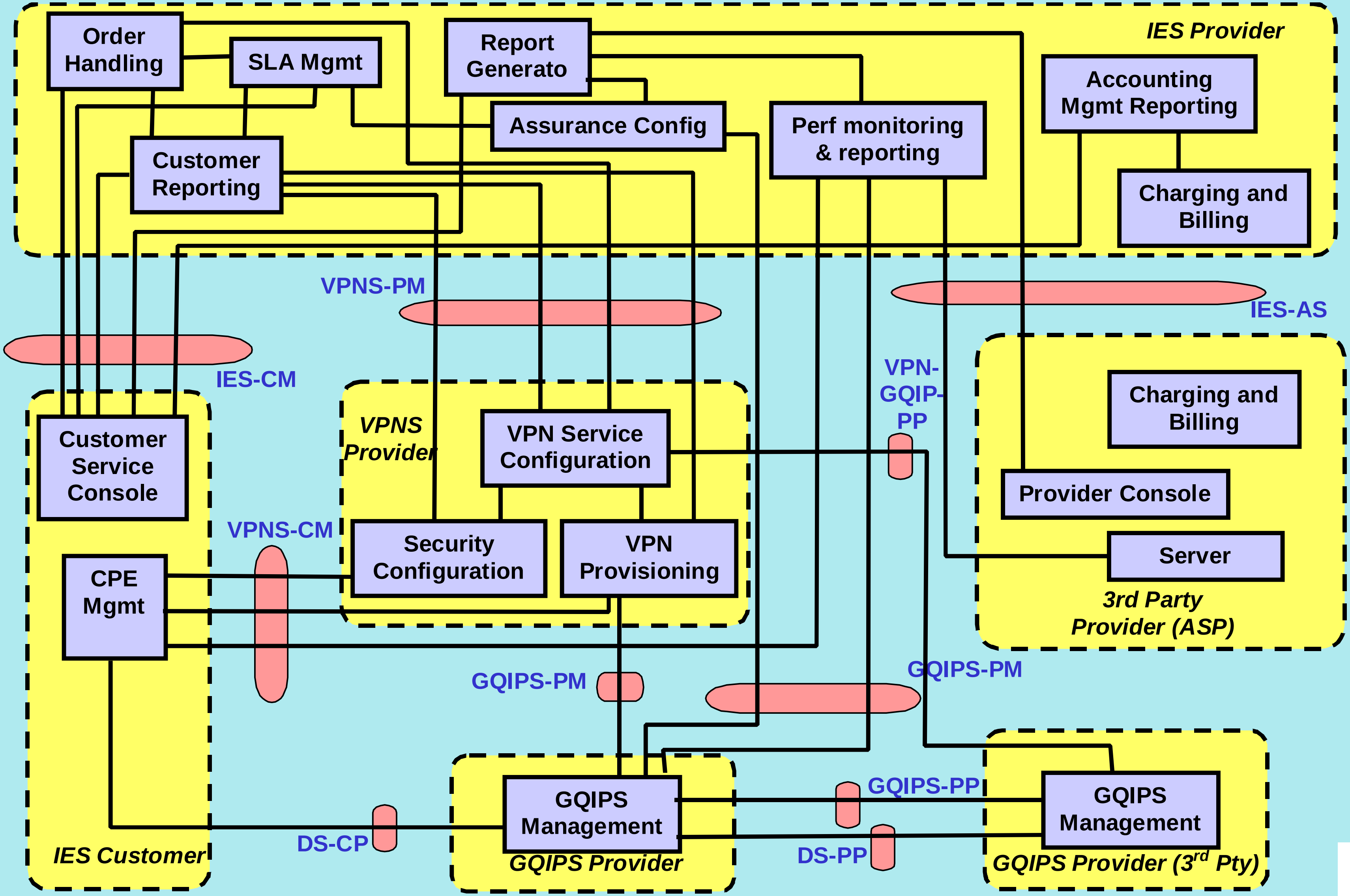
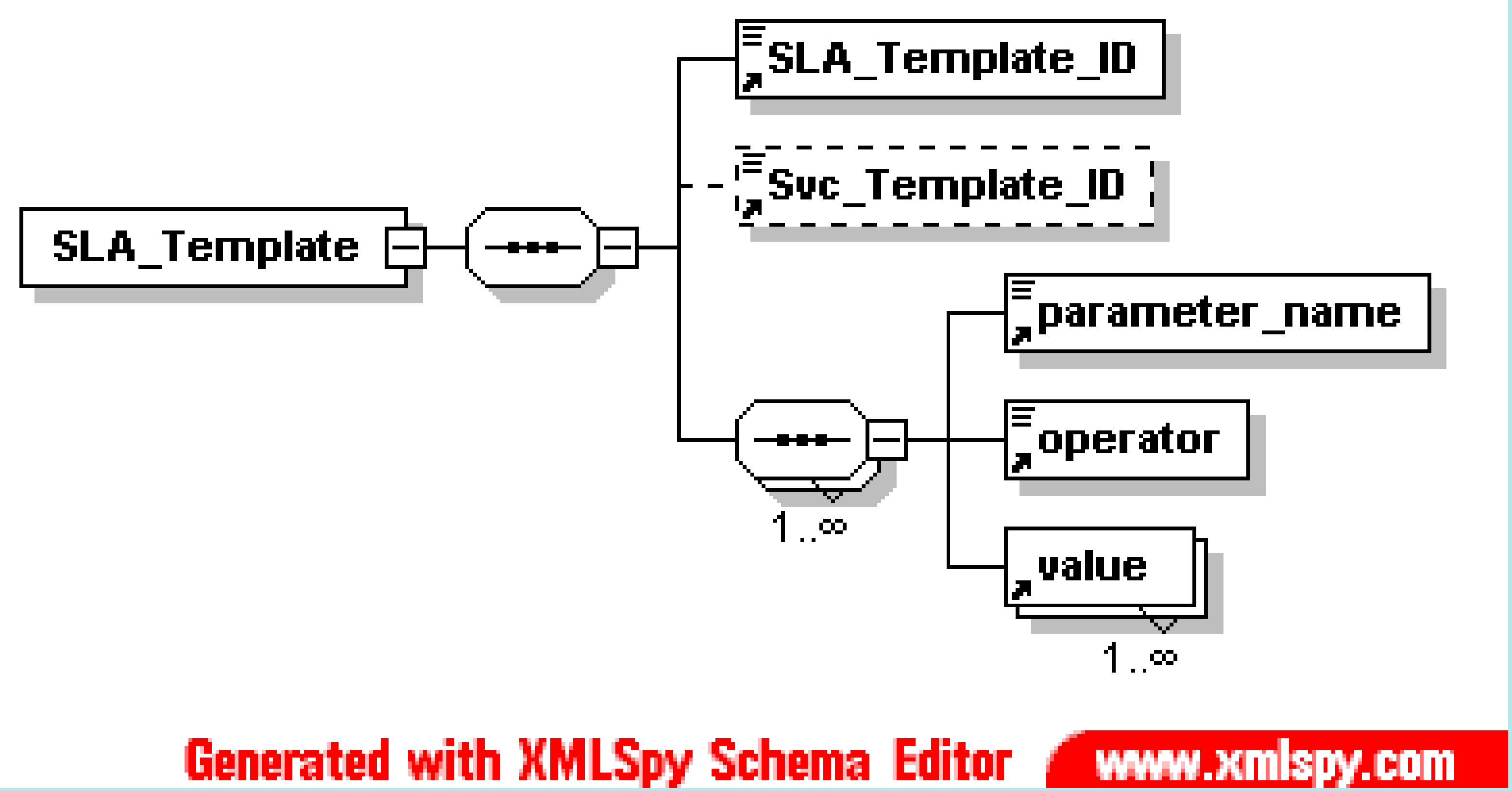
Refined Business Processes



slaML: SLA Template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