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# ForCES Implementation Experience

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# Summary

- Document Goal.
  - ForCES Architecture.
    - Pre-association setup.
    - TML.
    - Model.
    - Protocol.
  - SCTP Development Platform.
  - What's next?
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# Document goal

- Help developers implement by
    - Capturing the implementation experience of the Protocol, Model & Sctp-tml.
    - Providing Ideas and Proposals for implementation.
    - Mentioning possible problems and choices.
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# ForCES Architecture

## Pre-Association Setup

- Managers should at least exchange the following info:
    - ❑ CE/FE ID.
    - ❑ CE/FE IP.
    - ❑ TML. If no TML is set, then SCTP chosen as default.
    - ❑ Priority ports.
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# ForCES Architecture - TML

- Sctp-TML is mandatory.
  - Issues for the TML:
    - Security.
    - NAT issues for priority ports.
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# ForCES Architecture – Model

- Statement: Model is very dynamic.
  - Goal: Scalable implementation of new LFBs.
  - Solution: Inheritance.
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# ForCES Architecture – Model (2)

## Components.

- Common Parameters:
    - ID.
    - Access Right.
    - If it is Variable Length.
    - If it is Optional.
    - Data Size.
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# ForCES Architecture – Model (2)

## Components (2).

- **Common Functions:**
    - ❑ Constructor/Deconstructor.
    - ❑ Get Parameter Values.
    - ❑ Get/Set/Del Full/Sparse Data.
    - ❑ Get/Set/Del Hardware Value.
    - ❑ Get Data.
    - ❑ Clone Component.
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## ForCES Architecture – Model (2) Components (3).

- Any Atomic Component can be built as a child of the basic component.
  - A Struct Component is a component
    - Contains a static array of Components.
    - The ID of the inner component is the array index.
    - Clone Function returns same struct.
  - An Array Component
    - For each Row have a mother Component.
    - For a new Row, Clone Component from mother.
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# ForCES Architecture – Model (3)

## LFBs (1).

- Same Concept.
  - Common Properties.
    - LFB Class ID.
    - LFB Instance ID.
    - Array of Components.
  - Common Functions.
    - Handle Config/Query Command.
    - Get Class/Instance ID.
  - For an FE it is required an array of LFBs.
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# ForCES Architecture – Model (3)

## LFBs (2) - Example.

//FEID

```
cui = new Component_uint(FEPO_FEID, ACCESS_READ_ONLY, FE_id);  
Components[cui->get_ComponentId()]=cui; //Add component
```

//Current FEHB Policy Value

```
cub = new Component_uByte(FEPO_FEHBPolicy, ACCESS_READ_WRITE, 0);  
Components[cub->get_ComponentId()]=cub; //Add component
```

//FEIDs for BackupCEs Array

```
cui = new Component_uint(0, ACCESS_READ_WRITE, 0);  
ca = new Component_Array(FEPO_BackupCEs, ACCESS_READ_WRITE);  
ca->AddRow(cui, 1);  
ca->AddMotherComponent(cui);  
Components[ca->get_ComponentId()]=ca; //Add BackupCEs Array component
```

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# ForCES Architecture – Protocol

- **Statements:**
    - Protocol messages are very dynamic.
    - Batching messages.
    - Multiple Selects/Operations/Component Targets within one message.
  - **Goal: Scalable architecture for handling all messages.**
  - **Solution: Inheritance.**
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# ForCES Architecture – Protocol (2)

- All protocol message have a:
    - Header
    - Rest of Packet (Data)
      - Divided in TLVs
      - Only one case of ILVs (Sparse Data).
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# ForCES Architecture – Protocol (3)

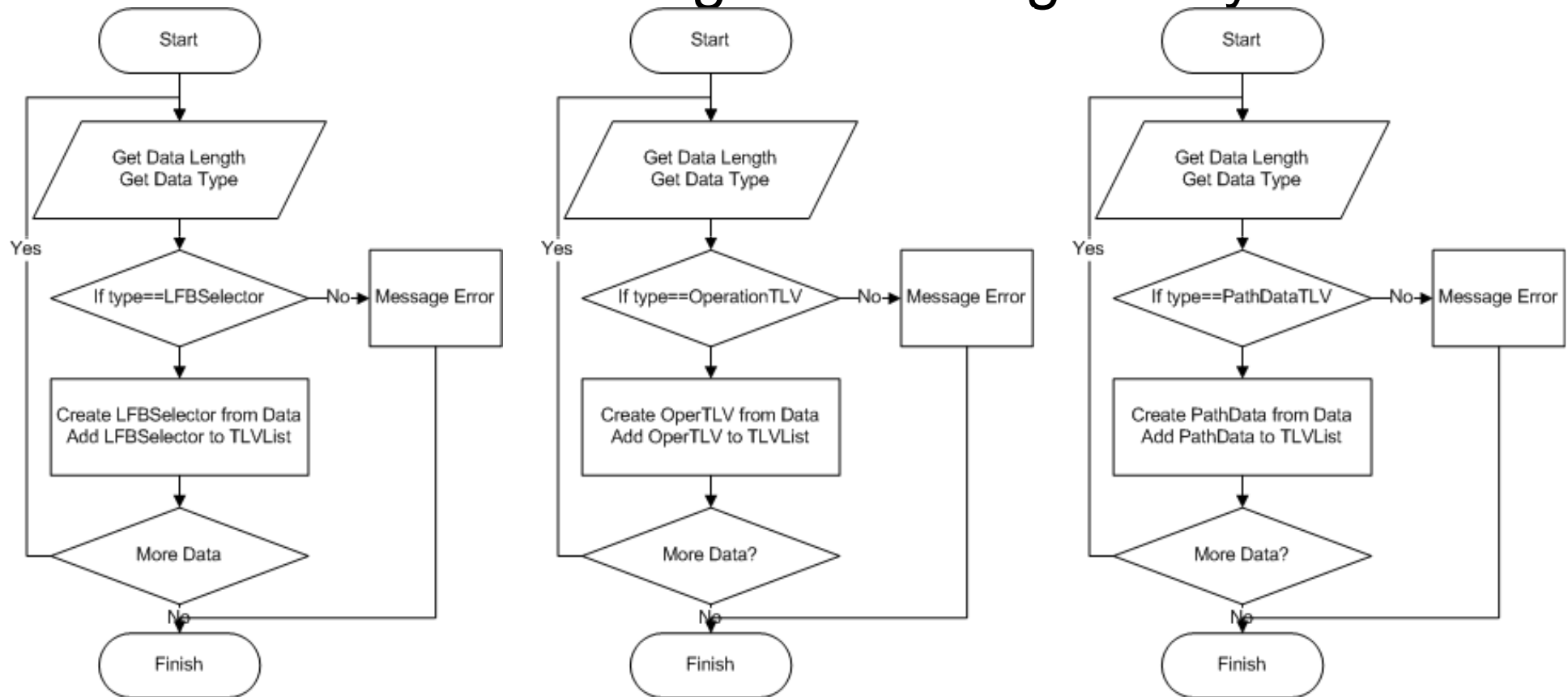
## TLV (1)

- Common TLV Attributes
    - Type
    - Length
    - Data
    - Array of TLVs.
  - Common Functions
    - Constructor/Deconstructor
    - Add/Get/Replace TLV of next Level
    - Get/Set Data
    - Get/Set Type
    - Get Length
    - Serialize/Deserialize TLV
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# ForCES Architecture – Protocol (3)

## TLV (2)

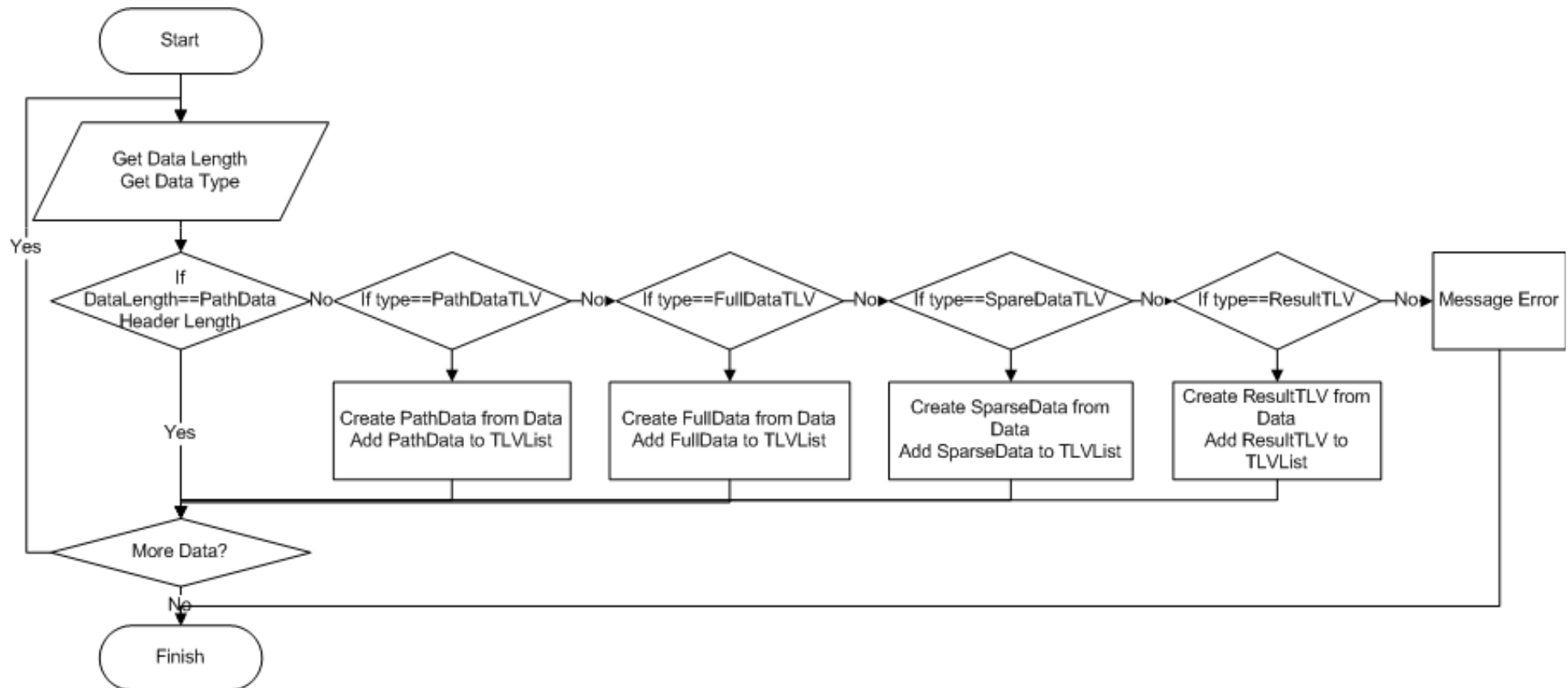
### ■ Deserialize Message for Config/Query.



# ForCES Architecture – Protocol (3)

## TLV (3)

### ■ Deserialize PathData TLV.





# SCTP Development Platform

Platform ----- Language	Windows	Linux	Solaris
C/C++	Supported	Supported	Supported
Java	Limited Third Party Not from Sun	Supported	Supported

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## What's next?

- Request to be added as WorkGroup Document.
  - Request for Comments.
  - Goal: To become an informational RFC.
  - Change to Implementation Guidelines?
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