



Core Information Model (CoreModel)

TR-512.x

[specific area]

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Important note

This Technical Recommendations has been approved by the Project TST, but has not been approved by the ONF board. This Technical Recommendation is an update to a previously released TR specification, but it has been approved under the ONF publishing guidelines for 'Informational' publications that allow Project technical steering teams (TSTs) to authorize publication of Informational documents. The designation of '-info' at the end of the document ID also reflects that the project team (not the ONF board) approved this TR.

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Document History

Version	Date	Description of Change
1.0	March 30, 2015	Initial version of the base document of the "Core Information Model" fragment of the ONF Common Information Model (ONF-CIM).
1.1	November 24, 2015	Version 1.1
1.2	September 20, 2016	Version 1.2 [Note Version 1.1 was a single document whereas 1.2 is broken into a number of separate parts]
1.3	September 2017	Document name changed. Was TR-512.11 in Version 1.2. [Published via wiki only]
1.3.1	January 2018	Addition of text related to approval status.
1.4	November 2018	No changes.

1 Introduction

This document is an addendum to the TR-512 ONF Core Information Model and forms part of the description of the ONF-CIM. For general overview material and references to the other parts refer to [TR-512.1](#).

1.1 References

For a full list of references see [TR-512.1](#).

1.2 Definitions

For a full list of definition see [TR-512.1](#).

1.3 Conventions

See [TR-512.1](#) for an explanation of:

- UML conventions
- Lifecycle Stereotypes
- Diagram symbol set

1.4 Viewing UML diagrams

Some of the UML diagrams are very dense. To view them either zoom (sometimes to 400%) or open the associated image file (and zoom appropriately) or open the corresponding UML diagram via Papyrus (for each figure with a UML diagram the UML model diagram name is provided under the figure or within the figure).

1.5 Understanding the figures

Figures showing fragments of the model using standard UML symbols as well as figures illustrating application of the model are provided throughout this document. Many of the application-oriented figures also provide UML class diagrams for the corresponding model fragments (see [TR-512.1](#) for diagram symbol sets). All UML diagrams depict a subset of the relationships between the classes, such as inheritance (i.e. specialization), association relationships (such as aggregation and composition), and conditional features or capabilities. Some UML diagrams also show further details of the individual classes, such as their attributes and the data types used by the attributes.

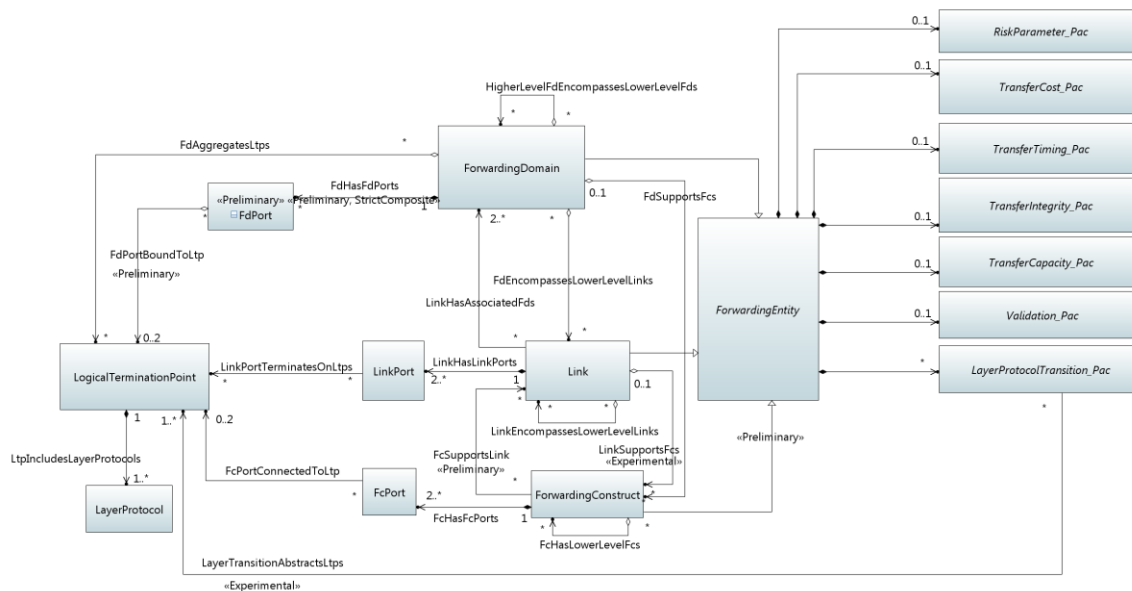
2 Introduction to the [specific area]

The focus of this document is the parts of Core Network Model of the ONF-CIM that deal with [specific area]. [specific area text].

A data dictionary that sets out the details of all classes, data types and attributes is also provided ([TR-512.DD](#)).

3 Details of [specific area]

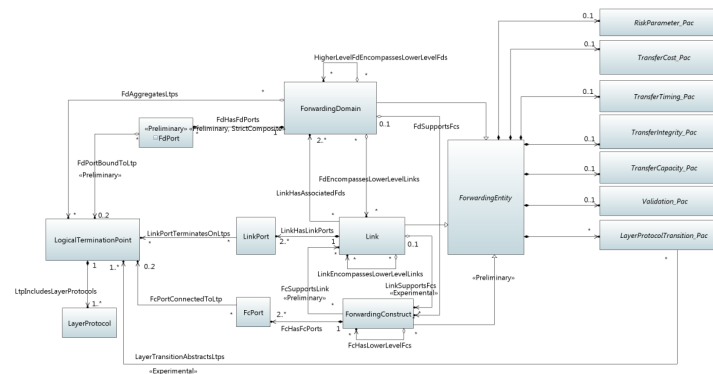
3.1 Use of **insert Standard Diagram** fragment



CoreModel diagram: Topology-HighLevelOverviewOfStructureAndPacs-LargeText

Figure 3-1 Key classes that form the network topology

3.2 Use of **insert Small Diagram** fragment



CoreModel diagram: Topology-HighLevelOverviewOfStructureAndPacs-LargeText

Figure 3-2 Key classes that form the network topology

3.3 Simple use of **insert Class** fragment for specific class list

3.3.1 FcRoute

Qualified Name: CoreModel::CoreNetworkModel::ObjectClasses::Resilience::FcRoute

Each instance of an FC Route (FcRoute) class models an individual route of an FC. The route is an alternative view of the internal structure of the FC to FC aggregation (see FcHasLowerLeverFcs association).

There are cases where a route is the most appropriate representation and cases where the aggregation approach is the most appropriate representation.

The route of an FC object is represented by a list of FCs at a lower level with the implicit understanding that unmodeled link connections are interleaved between the lower level FCs.

Note that depending on the service supported by an FC, the FC can have multiple routes.

The FcRoute is also applicable where an NE level ForwardingDomain may be decomposed into subordinate ForwardingDomains.

Applies to both virtual and real NE cases.

Inherits properties from:

- GlobalClass

3.3.2 FcSwitch

Qualified Name: CoreModel::CoreNetworkModel::ObjectClasses::Resilience::FcSwitch

The FcSwitch class models the switched forwarding of traffic (traffic flow) between FcPorts and is present where there is protection functionality in the FC.

If an FC exposes protection (having two or more FcPorts that provide alternative identical inputs/outputs), the FC will have one or more associated FcSwitch objects to represent the alternative flow choices visible at the edge of the FC.

The FC switch represents and defines a protection switch structure encapsulated in the FC and essentially "decorates" FCs that are involved in resilience schemes that use switching in a protection mechanism.

Essentially FcSwitch performs one of the functions of the Protection Group in a traditional model. It associates 2 or more FcPorts each playing the role of a Protection Unit.

One or more protection, i.e. standby/backup, FcPorts provide protection for one or more working (i.e. regular/main/preferred) FcPorts where either protection or working can feed one or more protected FcPort.

The switch may be used in revertive or non-revertive (symmetric) mode. When in revertive mode it may define a waitToRestore time. It may be used in one of several modes including source switched, destination switched, source and destination switched etc. (covering cases such as 1+1 and 1:1).

It may be locked out (prevented from switching), force switched or manual switched.

It will indicate switch state and change of state.

The switch can be switched away from all sources such that it becomes open and hence two coordinated switches can both feed the same LTP so long as at least one of the two is switched away from all sources (is "open").

The ability for a Switch to be "high impedance" allows bidirectional ForwardingConstructs to be overlaid on the same bidirectional LTP where the appropriate control is enabled to prevent signal conflict.

This ability allows multiple alternate routes to be present that otherwise would be in conflict.

Inherits properties from:

- LocalClass

3.4 Simple use of **insert Attribute Table Brief** fragment for specific class list

3.4.1 FcRoute

Table 1: Attributes for FcRoute

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
selectionPriority	Preliminary	<p>The preference priority of the resource in the resilience scheme for a particular FC.</p> <p>The lower the value the higher the priority.</p> <p>A lower value of selection priority is preferred</p> <p>If two resources have the same value they are of equal priority.</p> <p>There is no preference between equal priorities.</p> <p>If a resource with the lowest value selection priority fails, then the next lowest value available (may be the same value) is picked.</p> <p>Hence on failure of the current resource the next best available will be selected.</p> <p>If there are several equal values, the choice is essentially arbitrary).</p> <p>If the scheme is revertive then when a resource of higher priority than the currently selected resource recovers it will be selected.</p> <p>This is equivalent to working/protection but allows for all static scheme types with n:m capability.</p> <p>In simple schemes 0 = working and 1 = protecting.</p> <p>If selection priority of a Route is increased in value and the Route is currently selecting this Route, then if another Route of a lower selection priority value is available the wait to restore process will come into action as if the other Route had just become available.</p> <p>If selection priority of a Route is changed and the FC is not currently selecting this Route but is selecting an item that is now of a higher numeric value than the changed Route, then the wait to restore process will come into action as if the other Route had just become available.</p>
routeSelectionControl	Preliminary	Degree of administrative control applied to the route selection.
routeSelectionReason	Preliminary	The reason for the current route selection.

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
_fc		The list of FCs describing the route of an FC. In most cases the FcRoute has 2 or more FCs however there are some cases where a Route with one FC is valid.
_link		See referenced class

3.4.2 FcSwitch

Table 2: Attributes for FcSwitch

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
holdOffTime	Obsolete	Moved to ControlParameter_Pac. This attribute indicates the time, in seconds, between declaration of unacceptable quality of signal on the currently selected FcPort, and the initialization of the protection switching algorithm.
protType	Obsolete	Indicates the protection scheme that is used for the ProtectionGroup.
reversionMode	Obsolete	Moved to ControlParameter_Pac. This attribute whether or not the protection scheme is revertive or non-revertive.

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
switchControl	Preliminary	Degree of administrative control applied to the switch selection.
switchSelectsPorts	Preliminary	Indicates whether the switch selects from ingress to the FC or to egress of the FC, or both.
switchSelectionReason	Preliminary	The reason for the current switch selection.
waitToRestoreTime	Obsolete	Moved to ControlParameter_Pac and changed to waitToRevert. If the protection system is revertive, this attribute specifies the amount of time, in seconds, to wait after the preferred FcPort returns to an acceptable state of operation (e.g. a fault has cleared) before restoring traffic to that preferred FcPort.
_selectedFcPort		Indicates which points are selected by the switch. Depending on the switch spec (via FcSpec) - more than one FcPort can be selected at any one time (e.g. egress switch, ingress packet switch) - zero FcPorts can be selected. For an ingress switch this indicates that the switch common (egress) is "high impedance"
_profileProxy	Experimental	Provides a set of predefined values for switch control in place of the direct values available via the FcSwitch or via _configurationAndSwitchControl.

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
_configurationAndSwitchControl	Experimental	A ConfigurationAndSwitchController that is external to the switch (it is coordinating many switches and hence cannot be encapsulated in the FcSwitch).
_internalConfigurationAndSwitchControl	Experimental	A ConfigurationAndSwitchController encapsulated in the FcSwitch that controls the FcSwitch alone.
_controlParameters		See referenced class

3.5 Simple use of **insert Ten Specified Attribute Table Brief** fragment for specific class list

3.5.1 FcSwitch

Table 3: Attributes for FcSwitch

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
holdOffTime	Obsolete	Moved to ControlParameter_Pac. This attribute indicates the time, in seconds, between declaration of unacceptable quality of signal on the currently selected FcPort, and the initialization of the protection switching algorithm.

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
waitToRestoreTime	Obsolete	Moved to ControlParameter_Pac and changed to waitToRevert. If the protection system is revertive, this attribute specifies the amount of time, in seconds, to wait after the preferred FcPort returns to an acceptable state of operation (e.g. a fault has cleared) before restoring traffic to that preferred FcPort.

3.6 Use of **insert start attribute table** and **insert attribute row** fragment for specific class list (previous method is preferred)

3.6.1 FcRoute

Table 4: Attributes for FcRoute

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
routeSelectionControl	Preliminary	Degree of administrative control applied to the route selection.
routeSelectionReason	Preliminary	The reason for the current route selection.

3.6.2 FcSwitch

Table 5: Attributes for FcSwitch

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
switchSelectionReason	Preliminary	The reason for the current switch selection.

3.7 Intertwining of **insert Class** fragment and **insert Attribute Table Brief** fragment for a specific class

3.7.1 FcSwitch

Qualified Name: CoreModel::CoreNetworkModel::ObjectClasses::Resilience::FcSwitch

The FcSwitch class models the switched forwarding of traffic (traffic flow) between FcPorts and is present where there is protection functionality in the FC.

If an FC exposes protection (having two or more FcPorts that provide alternative identical inputs/outputs), the FC will have one or more associated FcSwitch objects to represent the alternative flow choices visible at the edge of the FC.

The FC switch represents and defines a protection switch structure encapsulated in the FC and essentially "decorates" FCs that are involved in resilience schemes that use switching in a protection mechanism.

Essentially FcSwitch performs one of the functions of the Protection Group in a traditional model. It associates 2 or more FcPorts each playing the role of a Protection Unit.

One or more protection, i.e. standby/backup, FcPorts provide protection for one or more working (i.e. regular/main/preferred) FcPorts where either protection or working can feed one or more protected FcPort.

The switch may be used in revertive or non-revertive (symmetric) mode. When in revertive mode it may define a waitToRestore time. It may be used in one of several modes including source switched, destination switched, source and destination switched etc. (covering cases such as 1+1 and 1:1).

It may be locked out (prevented from switching), force switched or manual switched.

It will indicate switch state and change of state.

The switch can be switched away from all sources such that it becomes open and hence two coordinated switches can both feed the same LTP so long as at least one of the two is switched away from all sources (is "open").

The ability for a Switch to be "high impedance" allows bidirectional ForwardingConstructs to be overlaid on the same bidirectional

LTP where the appropriate control is enabled to prevent signal conflict.
This ability allows multiple alternate routes to be present that otherwise would be in conflict.

Inherits properties from:

- LocalClass

Table 6: Attributes for FcSwitch

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
holdOffTime	Obsolete	Moved to ControlParameter_Pac. This attribute indicates the time, in seconds, between declaration of unacceptable quality of signal on the currently selected FcPort, and the initialization of the protection switching algorithm.
protType	Obsolete	Indicates the protection scheme that is used for the ProtectionGroup.
reversionMode	Obsolete	Moved to ControlParameter_Pac. This attribute whether or not the protection scheme is revertive or non-revertive.
switchControl	Preliminary	Degree of administrative control applied to the switch selection.
switchSelectsPorts	Preliminary	Indicates whether the switch selects from ingress to the FC or to egress of the FC, or both.

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
switchSelectionReason	Preliminary	The reason for the current switch selection.
waitToRestoreTime	Obsolete	Moved to ControlParameter_Pac and changed to waitToRevert. If the protection system is revertive, this attribute specifies the amount of time, in seconds, to wait after the preferred FcPort returns to an acceptable state of operation (e.g. a fault has cleared) before restoring traffic to that preferred FcPort.
_selectedFcPort		Indicates which points are selected by the switch. Depending on the switch spec (via FcSpec) - more than one FcPort can be selected at any one time (e.g. egress switch, ingress packet switch) - zero FcPorts can be selected. For an ingress switch this indicates that the switch common (egress) is "high impedance"
_profileProxy	Experimental	Provides a set of predefined values for switch control in place of the direct values available via the FcSwitch or via _configurationAndSwitchControl.
_configurationAndSwitchControl	Experimental	A ConfigurationAndSwitchController that is external to the switch (it is coordinating many switches and hence cannot be encapsulated in the FcSwitch.

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
_internalConfigurationAndSwitchControl	Experimental	A ConfigurationAndSwitchController encapsulated in the FcSwitch that controls the FcSwitch alone.
_controlParameters		See referenced class

3.8 Intertwining of **insert Class** fragment and **insert Attribute Table Brief** fragment for a specific class with fragments of text after each table.

3.8.1 FcRoute

Qualified Name: CoreModel::CoreNetworkModel::ObjectClasses::Resilience::FcRoute

Each instance of an FC Route (FcRoute) class models an individual route of an FC. The route is an alternative view of the internal structure of the FC to FC aggregation (see FcHasLowerLevelFcs association).

There are cases where a route is the most appropriate representation and cases where the aggregation approach is the most appropriate representation.

The route of an FC object is represented by a list of FCs at a lower level with the implicit understanding that unmodeled link connections are interleaved between the lower level FCs.

Note that depending on the service supported by an FC, the FC can have multiple routes.

The FcRoute is also applicable where an NE level ForwardingDomain may be decomposed into subordinate ForwardingDomains.

Applies to both virtual and real NE cases.

Inherits properties from:

- GlobalClass

Table 7: Attributes for FcRoute

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
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Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
selectionPriority	Preliminary	<p>The preference priority of the resource in the resilience scheme for a particular FC.</p> <p>The lower the value the higher the priority.</p> <p>A lower value of selection priority is preferred</p> <p>If two resources have the same value they are of equal priority.</p> <p>There is no preference between equal priorities.</p> <p>If a resource with the lowest value selection priority fails, then the next lowest value available (may be the same value) is picked.</p> <p>Hence on failure of the current resource the next best available will be selected.</p> <p>If there are several equal values, the choice is essentially arbitrary).</p> <p>If the scheme is revertive then when a resource of higher priority than the currently selected resource recovers it will be selected.</p> <p>This is equivalent to working/protection but allows for all static scheme types with n:m capability.</p> <p>In simple schemes 0 = working and 1 = protecting.</p> <p>If selection priority of a Route is increased in value and the Route is currently selecting this Route, then if another Route of a lower selection priority value is available the wait to restore process will come into action as if the other Route had just become available.</p> <p>If selection priority of a Route is changed and the FC is not currently selecting this Route but is selecting an item that is now of a higher numeric value than the changed Route, then the wait to restore process will come into action as if the other Route had just become available.</p>
routeSelectionControl	Preliminary	Degree of administrative control applied to the route selection.
routeSelectionReason	Preliminary	The reason for the current route selection.
_fc		<p>The list of FCs describing the route of an FC.</p> <p>In most cases the FcRoute has 2 or more FCs however there are some cases where a Route with one FC is valid.</p>

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
_link		See referenced class

Considering the table above the selectionPriority....

3.8.2 FcSwitch

Qualified Name: CoreModel::CoreNetworkModel::ObjectClasses::Resilience::FcSwitch

The FcSwitch class models the switched forwarding of traffic (traffic flow) between FcPorts and is present where there is protection functionality in the FC.

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The ability for a Switch to be "high impedance" allows bidirectional ForwardingConstructs to be overlaid on the same bidirectional LTP where the appropriate control is enabled to prevent signal conflict.

This ability allows multiple alternate routes to be present that otherwise would be in conflict.

Inherits properties from:

- LocalClass

Table 8: Attributes for FcSwitch

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
holdOffTime	Obsolete	Moved to ControlParameter_Pac. This attribute indicates the time, in seconds, between declaration of unacceptable quality of signal on the currently selected FcPort, and the initialization of the protection switching algorithm.
protType	Obsolete	Indicates the protection scheme that is used for the ProtectionGroup.
reversionMode	Obsolete	Moved to ControlParameter_Pac. This attribute whether or not the protection scheme is revertive or non-revertive.
switchControl	Preliminary	Degree of administrative control applied to the switch selection.
switchSelectsPorts	Preliminary	Indicates whether the switch selects from ingress to the FC or to egress of the FC, or both.
switchSelectionReason	Preliminary	The reason for the current switch selection.

Attribute Name	Lifecycle Stereotype (empty = Mature)	Description
waitToRestoreTime	Obsolete	Moved to ControlParameter_Pac and changed to waitToRevert. If the protection system is revertive, this attribute specifies the amount of time, in seconds, to wait after the preferred FcPort returns to an acceptable state of operation (e.g. a fault has cleared) before restoring traffic to that preferred FcPort.
_selectedFcPort		Indicates which points are selected by the switch. Depending on the switch spec (via FcSpec) - more than one FcPort can be selected at any one time (e.g. egress switch, ingress packet switch) - zero FcPorts can be selected. For an ingress switch this indicates that the switch common (egress) is "high impedance" .
_profileProxy	Experimental	Provides a set of predefined values for switch control in place of the direct values available via the FcSwitch or via _configurationAndSwitchControl.
_configurationAndSwitchControl	Experimental	A ConfigurationAndSwitchController that is external to the switch (it is coordinating many switches and hence cannot be encapsulated in the FcSwitch.
_internalConfigurationAndSwitchControl	Experimental	A ConfigurationAndSwitchController encapsulated in the FcSwitch that controls the FcSwitch alone.
_controlParameters		See referenced class

Considering the table above the holdOffTime....

End of document