

**OPC Data Model for Configuration and
Diagnostic Parameters of Time
Synchronization**

November 2, 2017

Industrial end devices are using and adopting 802.1AS for time synchronization. Some of these devices use a communications protocol called OPC-UA for both communication of run-time data and for configuration of the end nodes. OPC-UA defines both a set of communication protocols and a common mechanism for defining standard interoperable data structures. This is analogous to some IT protocols such as how RESTConf defines a communication mechanism and YANG defines a data structure.

OPC defines data structures in data models and often will create “Companion Specifications” to allow mapping of data elements from one industry or application into OPC-UA in a standard way.

As an example here is a snippet from a data model referring to details of a network interface.

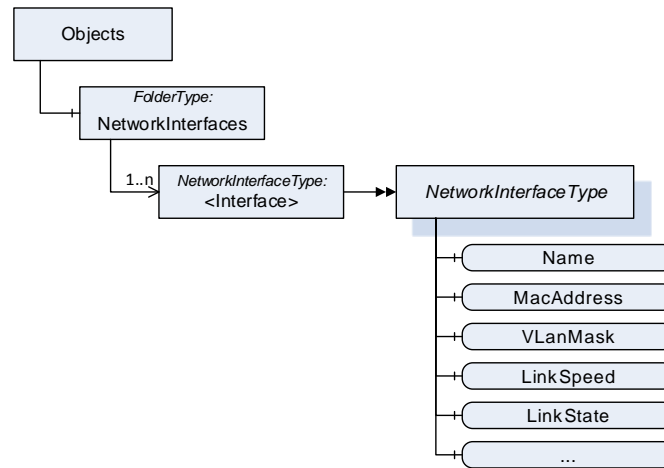


Figure 1 – NetworkInterfaceType

Table 1 – NetworkInterfaceType Definition

Attribute	Value				
BrowseName	NetworkInterfaceType				
IsAbstract	False				
References	Node Class	BrowseName	Data Type	Type Definition	Modelling Rule
Subtype of BaseQoSParametersType					
HasComponent	Variable	Name	String	BaseDataVariableType	Mandatory
HasComponent	Variable	MacAddress	Byte[]	MacAddressType []	Mandatory
HasComponent	Variable	HostInterfaceMacAddress	Byte[]	MacAddressType []	Optional
HasComponent	Variable	LinkSpeed	UInt32	BaseDataVariableType	Optional
HasComponent	Variable	LinkState	Boolean	BaseDataVariableType	Optional
HasComponent	Variable	MaxMtuSize	UInt16	BaseDataVariableType	Mandatory
HasComponent	Variable	TimeBetweenPackets	Duration	BaseDataVariableType	Mandatory
HasComponent	Variable	TransmissionJitter	Duration	BaseDataVariableType	Mandatory
HasComponent	Variable	SupportedShaperTypes	UInt16	BaseDataVariableType	Mandatory
HasComponent	Variable	SupportedSRClasses	SRClassType []	SRClassesType []	Optional
HasComponent	Variable	SupportedRedundancy	Byte	BaseDataVariableType	Mandatory
HasComponent	Variable	VlanTagCapable	Bool	BaseDataVariableType	

To support OPC-UA devices that want to monitor and configure IEEE802.1 AS the OPC Foundation would like to define an OPC-UA data model in an OPC-UA Companion Specification that can be used to carry IEEE 802.1AS parameters for purposes of remote monitoring and configuration.

For compatibility and clarity we would like to, as closely as is practical, reuse the names and data types of the IEEE 802.1AS standard. Specifically items defined in section 14 “Timing and synchronization management” would be referenced.

For example, the following OPC-UA data model maps to the 802.1AS Default Data Set:

Table x – IEEE802.1AS DefaultParameterSetType Definition

Attribute	Value				
BrowseName	DefaultParameterSetType				
IsAbstract	False				
References	Node Class	BrowseName	Data Type	Type Definition	Modelling Rule
Subtype of DataLinkLayerConfigType					
HasComponent	Variable	ClockIdentity	String	BaseDataVariableType	Mandatory
HasComponent	Variable	NumberPorts	Byte	BaseDataVariableType	Mandatory
HasComponent	Variable	ClockClass	Byte	ClockClassType	Mandatory
HasComponent	Variable	ClockAccuracy	Byte	ClockAccuracyType	Mandatory
HasComponent	Variable	OffsetScaledLogVariance	Int16	BaseDataVariableType	Mandatory
HasComponent	Variable	Priority1	Byte	BaseDataVariableType	Mandatory
HasComponent	Variable	Priority2	Byte	BaseDataVariableType	Mandatory
...

The OPC-UA text for this data model will state: "For specifications of each parameter listed under BrowseName, refer to IEEE Std 802.1AS-2011, 14.2."

OPC-UA will likely create similar data models for IEEE Std 802.1AS-2011 subclauses 14.3, 14.4, 14.5, 14.6, and 14.7.

The OPC-UA specifications will not copy text or tables directly from IEEE Std 802.1AS-2011, but will use references per IEEE-SA style. Therefore, OPC-UA does not assume that formal coordination is required for these references. If the IEEE 802.1 Working Group disagrees, or if any other guidance can be offered, OPC-UA welcomes a response.