

Document Title	Technical Report on Demands and Constraints on Base Software
Document Owner	AUTOSAR
Document Responsibility	AUTOSAR
Document Identification No	1120

Document Status	published
Part of AUTOSAR Standard	Adaptive Platform
Part of Standard Release	R24-11

Document Change History			
Date	Release	Changed by	Description
2024-11-27	R24-11	AUTOSAR Release Management	<ul style="list-style-type: none"> • Initial Release

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1 Introduction and functional overview

This document describes common aspects of usage of Adaptive Platform functionality towards Base SW, such as the OS or other kinds of "lower layer" SW. For the latter this may include requirements, proposed default settings of configuration parameters, usage constraints and alike. The previously used term 'common' indicates that the usage aspects do not reflect a single functional cluster (FC) perspective but instead addresses Base SW considerations potentially used by several functional clusters. In contrast Base SW aspects related to individual FC usage are covered by the respective SWS documents.

This document's main purpose is to assist different roles for setting up an development AP project such as the integrator. As such the Base SW topics in this document are not necessarily connected on their technical subjects. The focus of the document shall not be mixed with [1, AUTOSAR OSI interface specification], the latter addresses the interface from Adaptive Application perspective.

The current version includes default values for TCP/IP parameters. Other aspects for Base SW are expected to be included in future releases.

2 Acronyms and Abbreviations

The glossary below includes acronyms and abbreviations relevant to the Specification of Base Software that are not included in the [2, AUTOSAR glossary].

Abbreviation / Acronym	Description
ACK	Acknowledgement - message type of TCP providing confirmation about receiving the request to initiate the graceful shutdown or setup of a TCP connection
Base SW	Base Software - lower layer software that provides services or notifications to the Adaptive Platform, such as the operating system, hardware drivers, virtualization software, ...
DAD	Duplicate Address Detection
IETF RFC	Internet Engineering Task Force - Request For Comment: is a standard-like specification of protocols related to TCP/IP protocol suite
FIN	Finish - message type of TCP to initiate the graceful shutdown of a TCP connection
FINWAIT-2	TCP connection state at the communication peer after receiving the acknowledgement message (ACK) for connection termination
MTU	Maximum Transmission Unit
NDP	Neighbor Discovery Protocol
SYN	Synchronization - message type of TCP to initiate the setup of a TCP connection

Table 2.1: Acronyms and abbreviations used in the scope of this document

3 Related documentation

- [1] Specification of Operating System Interface
AUTOSAR_AP_SWS_OperatingSystemInterface
- [2] Glossary
AUTOSAR_FO_TR_Glossary
- [3] Specification of Manifest
AUTOSAR_AP_TPS_ManifestSpecification
- [4] Specification of TCP/IP Stack
AUTOSAR_CP_SWS_Tcplp

4 Default values for TCP/IP configuration

Aspects of configuration of Specification of Base Software are described in [3]. This chapter defines default values and semantic constraints for this configuration model.

4.1 Motivation

This section defines default values where useful for selected configuration parameters (where provision of such default value seems to be straightforward). These are defined in [3]. The motivation for providing these values is to simplify setting up an adaptive development project.

In other words the default values are meant to guide certain roles (e.g. developer, integrator) which values to choose to quickly get to a working configuration for Adaptive Machines. This document lists default values for parameters, which were proposed by AUTOSAR partners, based on experience from development projects. By intention, it makes no distinction between design and deployment.

Some default values are taken over from [4]. When there is no equivalent note provided, a default value is specified by AUTOSAR partners. It is worth noting that in any case the parameters and their default settings have been chosen for the optimization of in-vehicle communication between a AUTOSAR adaptive or classic platform instance with some vehicle local communication peer. This means optimization of TCP/IP communication for Automotive Ethernet. Hence the default values should work as well for in-vehicle communication including at least one adaptive platform communication peer.

External vehicle communication has not been considered for the definition of default values. Other types of physical media (e.g. for wireless connectivity) may require other TCP/IP values for optimizing communication. For example communication over media with longer round trip times (compared to Ethernet) need larger values for timeout settings. These aspects need to be taken into consideration based on the expected mixture of traffic over diverse type of media.

4.2 Default value settings

4.2.1 Default values for TCP parameters

Qualified attribute name	Default Value	Description
<code>MachineDesign.tcpIpProps.tcpProps.tcpDelayedAckTimeout</code>	0.01	maximum time in seconds an acknowledgment is delayed for transmission
<code>MachineDesign.tcpIpProps.tcpProps.tcpFinWait2Timeout</code>	1	timeout in seconds to receive a FIN from the remote node, after the local node has initiated connection termination, i.e. maximum time waiting in FINWAIT-2 state for a connection termination request from the remote TCP.
<code>MachineDesign.tcpIpProps.tcpProps.tcpKeepAliveEnabled</code>	TRUE	Keep alive is assumed to be an important mechanism to detect potential problems with communication peer. If enabled both peers regularly exchange messages to verify the connection status.
<code>MachineDesign.tcpIpProps.tcpProps.tcpKeepAliveInterval</code>	1	interval in seconds between subsequent keepalive probes
<code>MachineDesign.tcpIpProps.tcpProps.tcpKeepAliveProbesMax</code>	5	maximum number of times that a TCP Keep Alive is retransmitted before the connection is closed
<code>MachineDesign.tcpIpProps.tcpProps.tcpKeepAliveTime</code>	5	time in seconds between the last data packet sent (simple ACKs are not considered data) and the first keepalive probe
<code>MachineDesign.tcpIpProps.tcpProps.tcpMaxRtx</code>	5	maximum number of times that a TCP segment is retransmitted before the TCP connection is closed. This parameter is only valid if <code>tcpSynMaxRtx</code> is configured. Note: This parameter also applies for FIN retransmissions.
<code>MachineDesign.tcpIpProps.tcpProps.tcpMsl</code>	in the range between 0.5 and 30	maximum segment lifetime in seconds
<code>MachineDesign.tcpIpProps.tcpProps.tcpNagleEnabled</code>	FALSE	specifies whether Nagle algorithm is enabled. The algorithm improves efficiency of TCP/IP networks by reducing the number of packets that need to be sent over the network.
<code>MachineDesign.tcpIpProps.tcpProps.tcpReceiveWindowMax</code>	8192 (8 KByte)	maximum size of TCP window in byte
<code>MachineDesign.tcpIpProps.tcpProps.tcpRetransmissionTimeout</code>	in the range between 0.01 and 0.5	timeout in seconds before an unacknowledged TCP segment is sent again. If the timeout is disabled, no TCP segments shall be retransmitted.
<code>MachineDesign.tcpIpProps.tcpProps.tcpSynMaxRtx</code>	5	maximum number of times that a TCP SYN is retransmitted. SYN message is sent to request a TCP connection setup.
<code>MachineDesign.tcpIpProps.tcpProps.tcpTtl</code>	255	time-to-live in number of hops for outgoing TCP packets. This mechanism prevents undelivered TCP segments to be forwarded between nodes for an unspecified number of hops.

4.2.2 Default values for UDP parameters

Qualified attribute name	Default Value	Description
<code>MachineDesign.tcpIpProps.udpProps.udpTtl</code>	255	time-to-live in number of hops for outgoing UDP packets. This mechanism prevents undelivered UDP segments to be forwarded between nodes for an unspecified number of hops.

4.2.3 Default values for ICMPv4 parameters

Qualified attribute name	Default Value	Description
<code>MachineDesign.tcpIpIcmpProps.icmpV4Props.tcpIpIcmpV4EchoReplyEnabled</code>	FALSE	enables or disables transmission of ICMPv4 messages. Value is taken from classic platform [4]. Further it is assumed that there are more sophisticated mechanisms for diagnostic monitoring.

4.2.4 Default values for ICMPv6 parameters

Qualified attribute name	Default Value	Description
<code>MachineDesign.tcpIpIcmpProps.icmpV6Props.tcpIpIcmpV6EchoReplyAvoidFragmentation</code>	TRUE	Defines whether the echo reply is only transmitted in case that the incoming ICMPv6 Echo Request (Pings) fits the MTU of the respective interface, i.e. can be transmitted without IPv6 fragmentation. Assumption is that fragmentation of ICMP echo request will be no issue inside vehicle network (based on Ethernet communication).
<code>MachineDesign.tcpIpIcmpProps.icmpV6Props.tcpIpIcmpV6EchoReplyEnabled</code>	TRUE	Parameter enables or disables transmission of ICMP echo reply message in case of a ICMP echo reception.
<code>MachineDesign.tcpIpIcmpProps.icmpV6Props.tcpIpIcmpV6HopLimit</code>	255	time-to-live in number of hops for outgoing ICMPv6 packets. This mechanism prevents undelivered ICMPv6 packets to be forwarded between nodes for an unspecified number of hops.
<code>MachineDesign.tcpIpIcmpProps.icmpV6Props.tcpIpIcmpV6MsgDestinationUnreachableEnabled</code>	TRUE	Parameter enables or disables transmission of ICMP Destination Unreachable Messages.
<code>MachineDesign.tcpIpIcmpProps.icmpV6Props.tcpIpIcmpV6MsgParameterProblemEnabled</code>	TRUE	If enabled an ICMPv6 parameter problem message will be sent if a received packet has been dropped due to unknown options or headers that are found in the packet.

4.2.5 Default values for ARP parameters

Qualified attribute name	Default Value	Description
<code>MachineDesign.ethIpProps.arpProps.tcpIpArpNumGratuitousArpOnStartup</code>	0	number of gratuitous ARP replies which shall be sent on assignment of a new IP address. This is a specific type of ARP response message which was not triggered by an ARP request message.
<code>MachineDesign.ethIpProps.arpProps.tcpIpArpPacketQueueEnabled</code>	FALSE	Enables or disables support of the ARP packet queue according to IETF RFC 1122. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.arpProps.tcpIpArpRequestTimeout</code>	1	Timeout in seconds for the validity of ARP requests. After the transmission of an ARP request further transmission of ARP requests to the same destination shall be skipped for the specified duration. Value is taken from classic platform [4].

4.2.6 Default values for AutoIP parameters

Qualified attribute name	Default Value	Description
<code>MachineDesign.ethIpProps.autoIpProps.tcpIpAutoIpInitTimeout</code>	0	Specifies the time in seconds Auto-IP waits at startup, before beginning with ARP probing. This delay is used to give DHCP time to acquire a lease in case a DHCP server is present.

4.2.7 Default values for IPv4 fragmentation parameters

Qualified attribute name	Default Value	Description
<code>MachineDesign.ethIpProps.fragmentationProps.tcpIpIpFragmentationRxEnabled</code>	FALSE	Enables or disables support for reassembling of incoming datagrams that are fragmented according to IETF RFC 815 (IP Datagram ReassemblyAlgorithms). At least for in-vehicle communication with nodes connected to MTU of same size, Ethernet fragmentation is not needed. In case this argumentation is followed subsequent fragmentation related parameters, all of them taking the following prefix <code>MachineDesign.ethIpProps.fragmentationProps.</code> have no role in setting default values: <code>tcpIpIpNumFragments</code> <code>tcpIpIpNumReassDgrams</code> <code>tcpIpIpReassTimeout</code>

4.2.8 Default values for DHCPv6 parameters

Qualified attribute name	Default Value	Description
<code>MachineDesign.ethIpProps.dhcpProps.tcpIpDhcpV6CnfDelayMax</code>	1	maximum delay in seconds before sending the first confirm message. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.dhcpProps.tcpIpDhcpV6CnfDelayMin</code>	0	minimum delay in seconds before the first confirm message will be sent. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.dhcpProps.tcpIpDhcpV6InfDelayMax</code>	1	maximum delay in seconds before sending the first information request message. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.dhcpProps.tcpIpDhcpV6InfDelayMin</code>	0	minimum delay in seconds before sending the first information request message. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.dhcpProps.tcpIpDhcpV6SolDelayMax</code>	1	maximum delay in seconds before sending the first solicit message. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.dhcpProps.tcpIpDhcpV6SolDelayMin</code>	0	minimum delay in seconds before the first solicit message will be sent. Value is taken from classic platform [4].

4.2.9 Default values for NDP parameters

Qualified attribute name	Default Value	Description
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpDefaultReachableTime</code>	120	reachable time for NDP in seconds as specified by IETF RFC 4861.
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpDefaultRetransTimer</code>	in the range between 0.1 and 1	retransmission timer for NDP in seconds as specified by IETF RFC 4861.
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpDefaultRouterListSize</code>	2	size of router list. These entries may be used to send NDP messages. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpDefensiveProcessing</code>	FALSE	If enabled the NDP shall only process Neighbor Advertisements which are received in reaction to a previously transmitted Neighbor Solicitation as well as skipping updates to the Neighbor Cache based on received Neighbor Solicitations. If disabled all Neighbor Advertisements and Solicitations shall be processed as specified in RFC4861.
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpDelayFirstProbeTimeValue</code>	5	delay in seconds before sending the first "Neighbor Unreachable Detection" (NUD) probe. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpDestinationCacheSize</code>	5	maximum number of entries in the destination cache, which contains entries about all hosts on the network, which have already sent packets. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpDynamicHopLimitEnabled</code>	FALSE	If enabled the default hop limit may be reconfigured based on received router advertisements.
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpDynamicMtuEnabled</code>	FALSE	If enabled allows dynamic reconfiguration of link MTU via router advertisements.





<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpDynamicReachableTimeEnabled</code>	TRUE	If enabled the default reachable time value may be reconfigured based on received router advertisements.
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpDynamicRetransTimeEnabled</code>	TRUE	If enabled the default retransmit timer value may be reconfigured based on received router advertisements.
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpMaxRandomFactor</code>	15	maximum random factor used for randomization. In randomized neighbor discovery, each node transmits at randomly chosen times. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpMaxRtrSolicitationDelay</code>	1	maximum delay before the first Router Solicitation will be sent after interface initialization in seconds. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpMaxRtrSolicitations</code>	1	maximum number of Router Solicitations that will be sent before the first Router Advertisement has been received. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpMinRandomFactor</code>	5	minimum random factor used for randomization. In randomized neighbor discovery, each node transmits at randomly chosen times. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpNeighborUnreachabilityDetectionEnabled</code>	TRUE	If enabled Neighbor Unreachability Detection is used to remove unused entries from the neighbor cache. This feature is a basic feature of NDP and should be turned on.
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpNumMulticastSolicitations</code>	3	maximum number of multicast solicitations that will be sent when performing address resolution. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpNumUnicastSolicitations</code>	3	maximum number of unicast solicitations that will be sent when performing Neighbor Unreachability Detection. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpPacketQueueEnabled</code>	TRUE	If enabled supports a NDP Packet Queue according to IETF RFC 4861.
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpPrefixListSize</code>	5	maximum number of entries in the on-link prefix list. List includes valid address prefixes on the link, which may be used to protect the network from invalid messages. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpRandomReachableTimeEnabled</code>	TRUE	If enabled the value of ReachableTime will be multiplied with a random value between minimum and maximum random factor in order to prevent multiple nodes from transmitting at exactly the same time.
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpRndRtrSolicitationDelayEnabled</code>	TRUE	If enabled the first router solicitation will be delayed randomly between 0 and the maximum router solicitation delay. Otherwise the first router solicitation will be sent after exactly the value of specified maximum router solicitation delay. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpRtrSolicitationInterval</code>	4	interval between consecutive Router Solicitations in seconds. Value is taken from classic platform [4].





<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpSlaacDadNumberOfTransmissions</code>	1	number of Neighbor Solicitations that have to be unanswered in order to set an autoconfigured address to "preferred" (usable) state. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpSlaacDadRetransmissionDelay</code>	1	maximum value for the address configuration delay seconds. Value is taken from classic platform [4].
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpSlaacDelayEnabled</code>	FALSE	If enabled transmission of the first DAD (duplicate address detection). Neighbor Solicitation will be delayed by a random value between 0 and maximum DAD delay.
<code>MachineDesign.ethIpProps.ndpProps.tcpIpNdpSlaacOptimisticDadEnabled</code>	FALSE	If enabled it represents Optimistic Duplicate Address Detection (DAD) according to RFC4429 Value is taken from classic platform [4].

A Mentioned Manifest Elements

For the sake of completeness, this chapter contains a set of class tables representing meta-classes mentioned in the context of this document but which are not contained directly in the scope of describing specific meta-model semantics.

Chapter is generated.

Class	Dhcpv6Props			
Package	M2::AUTOSARTemplates::SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology			
Note	This meta-class specifies the configuration options for DHCPv6.			
Base	<i>ARObject</i>			
Aggregated by	Ipv6Props.dhcpProps			
Attribute	Type	Mult.	Kind	Note
tcplpDhcpV6CnfDelayMax	TimeValue	0..1	attr	Maximum delay in seconds before sending the first Confirm message. If this value is bigger than the previous minimum delay value a random delay will be chosen from the interval.
tcplpDhcpV6CnfDelayMin	TimeValue	0..1	attr	Minimum delay in seconds before the first Confirm message will be sent.
tcplpDhcpV6InfDelayMax	TimeValue	0..1	attr	Maximum delay in seconds before sending the first Information Request message. If this value is bigger than the previous minimum delay value a random delay will be chosen from the interval.
tcplpDhcpV6InfDelayMin	TimeValue	0..1	attr	Minimum delay (s) before the first Information Request message will be sent.
tcplpDhcpV6SolDelayMax	TimeValue	0..1	attr	Maximum delay in seconds before sending the first Solicit message. If this value is bigger than the previous minimum delay value a random delay will be chosen from the interval.
tcplpDhcpV6SolDelayMin	TimeValue	0..1	attr	Minimum delay (s) before the first Solicit message will be sent.

Table A.1: Dhcpv6Props

Class	EthTcplplcmpProps			
Package	M2::AUTOSARTemplates::SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology			
Note	This meta-class is used to configure the Machine specific ICMP (Internet Control Message Protocol) attributes Tags: atp.recommendedPackage=EthTcplplcmpProps			
Base	<i>ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDesignElement, UploadablePackageElement</i>			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
icmpV4Props	Tcplplcmpv4Props	0..1	aggr	ICMPv4 configuration properties
icmpV6Props	Tcplplcmpv6Props	0..1	aggr	ICMPv6 configuration properties

Table A.2: EthTcplplcmpProps

Class	EthTcplpProps			
Package	M2::AUTOSARTemplates::SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology			
Note	This meta-class is used to configure the Machine specific Tcplp Stack attributes. Tags: atp.recommendedPackage=EthTcplpProps			
Base	<i>ARElement, ARObject, CollectableElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDesignElement, UploadablePackageElement</i>			
Aggregated by	ARPackage.element			
Attribute	Type	Mult.	Kind	Note
tcpProps	TcpProps	0..1	aggr	TCP configuration properties
udpProps	UdpProps	0..1	aggr	UDP configuration properties

Table A.3: EthTcplpProps

Class	Ipv4ArpProps			
Package	M2::AUTOSARTemplates::SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology			
Note	Specifies the configuration options for the ARP (Address Resolution Protocol).			
Base	<i>ARObject</i>			
Aggregated by	Ipv4Props.arpProps			
Attribute	Type	Mult.	Kind	Note
tcpIpArpNumGratuitousArpOnStartup	PositiveInteger	0..1	attr	This attribute specifies the number of gratuitous ARP replies which shall be sent on assignment of a new IP address.
tcpIpArpPacketQueueEnabled	Boolean	0..1	attr	This attribute enables (TRUE) or disables (FALSE) support of the ARP Packet Queue according to IETF RFC 1122, section 2.3.2.2.
tcpIpArpRequestTimeout	TimeValue	0..1	attr	This attribute specifies a timeout in seconds for the validity of ARP requests. After the transmission of an ARP request the Tcplp shall skip the transmission of any further ARP requests to the same destination within a duration of tcpIpArpRequestTimeout seconds. (IETF RFC 1122, section 2.3.2.1).
tcpIpArpTableEntryTimeout	TimeValue	0..1	attr	This attribute specifies the timeout in seconds after which an unused ARP entry is removed.

Table A.4: Ipv4ArpProps

Class	Ipv4AutolpProps			
Package	M2::AUTOSARTemplates::SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology			
Note	Specifies the configuration options for Auto-IP (automatic private IP addressing).			
Base	<i>ARObject</i>			
Aggregated by	Ipv4Props.autolpProps			
Attribute	Type	Mult.	Kind	Note
tcpIpAutolpInitTimeout	TimeValue	0..1	attr	This attribute specifies the time in seconds Auto-IP waits at startup, before beginning with ARP probing. This delay is used to give DHCP time to acquire a lease in case a DHCP server is present.

Table A.5: Ipv4AutolpProps

Class	Ipv4FragmentationProps			
Package	M2::AUTOSARTemplates::SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology			
Note	Specifies the configuration options for IPv4 packet fragmentation/reassembly.			
Base	ARObject			
Aggregated by	Ipv4Props.fragmentationProps			
Attribute	Type	Mult.	Kind	Note
tcpIplpFragmentationRxEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) support for reassembling of incoming datagrams that are fragmented according to IETF RFC 815 (IP Datagram Reassembly Algorithms).
tcpIplpNumFragments	PositiveInteger	0..1	attr	Specifies the maximum number of IP fragments per datagram.
tcpIplpNumReassDgrams	PositiveInteger	0..1	attr	Specifies the maximum number of fragmented IP datagrams that can be reassembled in parallel.
tcpIplpReassTimeout	TimeValue	0..1	attr	Specifies the timeout in [s] after which an incomplete datagram gets discarded.

Table A.6: Ipv4FragmentationProps

Class	Ipv4Props			
Package	M2::AUTOSARTemplates::SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology			
Note	This meta-class specifies the configuration options for IPv4.			
Base	ARObject			
Aggregated by	EthIplpProps.ipv4Props			
Attribute	Type	Mult.	Kind	Note
arpProps	Ipv4ArpProps	0..1	aggr	Configuration properties for the ARP (Address Resolution Protocol).
autolpProps	Ipv4AutolpProps	0..1	aggr	Configuration options for Auto-IP (automatic private IP addressing).
fragmentationProps	Ipv4FragmentationProps	0..1	aggr	Configuration options for IPv4 packet fragmentation/reassembly.

Table A.7: Ipv4Props

Class	Ipv6NdpProps			
Package	M2::AUTOSARTemplates::SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology			
Note	This meta-class specifies the configuration options for the Neighbor Discovery Protocol for IPv6.			
Base	ARObject			
Aggregated by	Ipv6Props.ndpProps			
Attribute	Type	Mult.	Kind	Note
tcpIplpNdpDefaultReachableTime	TimeValue	0..1	attr	Configuration of the ReachableTime (s) specified in [RFC4861 6.3.2. Host Variables].
tcpIplpNdpDefaultRetransTimer	TimeValue	0..1	attr	Configures the default value (s) for the RetransTimer variable specified in [RFC4861 6.3.2. Host Variables].
tcpIplpNdpDefaultRouterListSize	PositiveInteger	0..1	attr	Maximum number of default router entries.





Class	Ipv6NdpProps			
tcpIpNdpDefensiveProcessing	Boolean	0..1	attr	If enabled the NDP shall only process Neighbor Advertisements which are received in reaction to a previously transmitted Neighbor Solicitation as well as skipping updates to the Neighbor Cache based on received Neighbor Solicitations. If disabled all Neighbor Advertisements and Solicitations shall be processed as specified in RFC4861.
tcpIpNdpDelayFirstProbeTimeValue	TimeValue	0..1	attr	Delay before sending the first NUD probe in (s).
tcpIpNdpDestinationCacheSize	PositiveInteger	0..1	attr	Maximum number of entries in the destination cache.
tcpIpNdpDynamicHopLimitEnabled	Boolean	0..1	attr	If enabled the default hop limit may be reconfigured based on received Router Advertisements.
tcpIpNdpDynamicMtuEnabled	Boolean	0..1	attr	Allow dynamic reconfiguration of link MTU via Router Advertisements.
tcpIpNdpDynamicReachableTimeEnabled	Boolean	0..1	attr	If enabled the default Reachable Time value may be reconfigured based on received Router Advertisements.
tcpIpNdpDynamicRetransTimeEnabled	Boolean	0..1	attr	If enabled the default Retransmit Timer value may be reconfigured based on received Router Advertisements.
tcpIpNdpMaxRandomFactor	PositiveInteger	0..1	attr	Maximum random factor used for randomization
tcpIpNdpMaxRtrSolicitationDelay	TimeValue	0..1	attr	Maximum delay before the first Router Solicitation will be sent after interface initialization in (s).
tcpIpNdpMaxRtrSolicitations	PositiveInteger	0..1	attr	Maximum number of Router Solicitations that will be sent before the first Router Advertisement has been received.
tcpIpNdpMinRandomFactor	PositiveInteger	0..1	attr	Minimum random factor used for randomization
tcpIpNdpNeighborUnreachabilityDetectionEnabled	Boolean	0..1	attr	Neighbor Unreachability Detection is used to remove unused entries from the neighbor cache. This feature is a basic feature of NDP and should be turned on.
tcpIpNdpNumMulticastSolicitations	PositiveInteger	0..1	attr	Maximum number of multicast solicitations that will be sent when performing address resolution.
tcpIpNdpNumUnicastSolicitations	PositiveInteger	0..1	attr	Maximum number of unicast solicitations that will be sent when performing Neighbor Unreachability Detection.
tcpIpNdpPacketQueueEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) support of a NDP Packet Queue according to IETF RFC 4861, section 7.2.2.
tcpIpNdpPrefixListSize	PositiveInteger	0..1	attr	Maximum number of entries in the on-link prefix list.
tcpIpNdpRandomReachableTimeEnabled	Boolean	0..1	attr	If enabled the value of ReachableTime will be multiplied with a random value between MIN_RANDOM_FACTOR and MAX_RANDOM_FACTOR in order to prevent multiple nodes from transmitting at exactly the same time.





Class	Ipv6NdpProps			
tcpIpNdpRndRtrSolicitationDelayEnabled	Boolean	0..1	attr	If enabled the first router solicitation will be delayed randomly from [0...MAX_RTR_SOLICITATION_DELAY]. Otherwise the first router solicitation will be sent after exactly MAX_RTR_SOLICITATION_DELAY milliseconds.
tcpIpNdpRtrSolicitationInterval	TimeValue	0..1	attr	Interval between consecutive Router Solicitations in (s).
tcpIpNdpSlaacDadNumberOfTransmissions	PositiveInteger	0..1	attr	Number of Neighbor Solicitations that have to be unanswered in order to set an autoconfigured address to PREFERRED (usable) state.
tcpIpNdpSlaacDadRetransmissionDelay	TimeValue	0..1	attr	Sets the maximum value for the address configuration delay (s).
tcpIpNdpSlaacDelayEnabled	Boolean	0..1	attr	If enabled transmission of the first DAD Neighbor Solicitation will be delayed by a random value from [0...MAX_DAD_DELAY].
tcpIpNdpSlaacOptimisticDadEnabled	Boolean	0..1	attr	Enable Optimistic Duplicate Address Detection (DAD) according to RFC4429.

Table A.8: Ipv6NdpProps

Class	Ipv6Props			
Package	M2::AUTOSARTemplates::SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology			
Note	This meta-class specifies the configuration options for IPv6.			
Base	ARObject			
Aggregated by	EthIpProps.ipv6Props			
Attribute	Type	Mult.	Kind	Note
dhcpProps	Dhcpv6Props	0..1	aggr	Configuration properties for DHCPv6.
fragmentationProps	Ipv6FragmentationProps	0..1	aggr	Configuration properties for IPv6 packet fragmentation/reassembly.
ndpProps	Ipv6NdpProps	0..1	aggr	Configuration properties for the Neighbor Discovery Protocol for IPv6.

Table A.9: Ipv6Props

Class	MachineDesign			
Package	M2::AUTOSARTemplates::AdaptivePlatform::SystemDesign			
Note	This meta-class represents the ability to define requirements on a Machine in the context of designing a system. Tags: atp.recommendedPackage=MachineDesigns			
Base	ARElement, ARObject, AtpClassifier, AtpFeature, AtpStructureElement, CollectableElement, FibexElement, Identifiable, MultilanguageReferrable, PackageableElement, Referrable, UploadableDesignElement, UploadablePackageElement			
Aggregated by	ARPackage.element, AtpClassifier.atpFeature			
Attribute	Type	Mult.	Kind	Note
accessControl	AccessControlEnum	0..1	attr	This attribute defines how the access restriction to the Service Instance is defined.





Class	MachineDesign			
communicationConnector	CommunicationConnector	*	aggr	This aggregation defines the network connection of the machine. Stereotypes: atpSplitable Tags: atp.Splitkey=communicationConnector.shortName
communicationController	CommunicationController	*	aggr	CommunicationControllers of the Machine that are used for description of 10-Base-T1S topologies Stereotypes: atpSplitable Tags: atp.Splitkey=communicationController.shortName
cryptoKeySlot	CryptoKeySlotDesign	*	aggr	This aggregation represents the key slots for which a key slot design is created in the context of the enclosing machine design. Stereotypes: atpSplitable Tags: atp.Splitkey=cryptoKeySlot.shortName
ethIpProps	EthIpProps	*	ref	Machine specific IP attributes.
functionalClusterDesign	AbstractFunctionalClusterDesign	*	aggr	Configuration settings for Functional Clusters on the machine design level.
pncPrepareSleepTimer	TimeValue	0..1	attr	Time in seconds the PNC state machine shall wait in PNC_PREPARE_SLEEP.
pnResetTimer	TimeValue	0..1	attr	Specifies the runtime of the reset timer in seconds. This reset time is valid for the reset of PN requests.
serviceDiscoveryConfig	ServiceDiscoveryConfiguration	*	aggr	Set of service discovery configuration settings that are defined on the machine for individual Communication Connectors. Stereotypes: atpSplitable Tags: atp.Splitkey=serviceDiscoveryConfig
tcplplcmpProps	EthTcplplcmpProps	*	ref	Machine specific ICMP (Internet Control Message Protocol) attributes
tcplpProps	EthTcplpProps	*	ref	Machine specific Tcplp Stack attributes.

Table A.10: MachineDesign

Class	Tcplplcmpv4Props			
Package	M2::AUTOSARTemplates::SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology			
Note	This meta-class specifies the configuration options for ICMPv4 (Internet Control Message Protocol).			
Base	ARObject			
Aggregated by	EthTcplplcmpProps.icmpV4Props			
Attribute	Type	Mult.	Kind	Note
tcplplcmpV4EchoReplyEnabled	Boolean	0..1	attr	This attribute enables or disables transmission of ICMP echo reply message in case of a ICMP echo reception.
tcplplcmpV4Ttl	PositiveInteger	0..1	attr	This attribute is only relevant in case that ICMP (Internet Control Message Protocol) is used. It specifies the default Time-to-live value of outgoing ICMP packets.

Table A.11: Tcplplcmpv4Props

Class	TcpIplcmpv6Props			
Package	M2::AUTOSARTemplates::SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology			
Note	This meta-class specifies the configuration options for ICMPv6 (Internet Control Message Protocol).			
Base	ARObject			
Aggregated by	EthTcpIplcmpProps.icmpV6Props			
Attribute	Type	Mult.	Kind	Note
tcpIplcmpV6EchoReplyAvoidFragmentation	Boolean	0..1	attr	This attribute defines whether the echo reply is only transmitted in case that the incoming ICMPv6 Echo Request (Pings) fits the MTU of the respective interface, i.e. can be transmitted without IPv6 fragmentation.
tcpIplcmpV6EchoReplyEnabled	Boolean	0..1	attr	This attribute enables or disables transmission of ICMP echo reply message in case of a ICMP echo reception.
tcpIplcmpV6HopLimit	PositiveInteger	0..1	attr	Default Hop-Limit value of outgoing ICMPv6 packets.
tcpIplcmpV6MsgDestinationUnreachableEnabled	Boolean	0..1	attr	This attribute Enables/Disables the transmission of Destination Unreachable Messages.
tcpIplcmpV6MsgParameterProblemEnabled	Boolean	0..1	attr	If enabled an ICMPv6 parameter problem message will be sent if a received packet has been dropped due to unknown options or headers that are found in the packet.

Table A.12: TcpIplcmpv6Props

Class	TcpProps			
Package	M2::AUTOSARTemplates::SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology			
Note	This meta-class specifies the configuration options for TCP (Transmission Control Protocol).			
Base	ARObject			
Aggregated by	EthTcpIplProps.tcpProps			
Attribute	Type	Mult.	Kind	Note
tcpCongestionAvoidanceEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) support of TCP congestion avoidance algorithm according to IETF RFC 5681.
tcpDelayedAckTimeout	TimeValue	0..1	attr	The maximal time an acknowledgement is delayed for transmission in seconds.
tcpFastRecoveryEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) support of TCP Fast Recovery according to IETF RFC 5681.
tcpFastRetransmitEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) support of TCP Fast Retransmission according to IETF RFC 5681.
tcpFinWait2Timeout	TimeValue	0..1	attr	Timeout in [s] to receive a FIN from the remote node (after this node has initiated connection termination), i.e. maximum time waiting in FINWAIT-2 for a connection termination request from the remote TCP.
tcpKeepAliveEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) TCP Keep Alive Probes according to IETF RFC 1122 chapter 4.2.3.6.
tcpKeepAliveInterval	TimeValue	0..1	attr	Specifies the interval in seconds between subsequent keepalive probes.
tcpKeepAliveProbesMax	PositiveInteger	0..1	attr	Maximum number of times that a TCP Keep Alive is retransmitted before the connection is closed.





Class	TcpProps			
tcpKeepAliveTime	TimeValue	0..1	attr	Specifies the time in [s] between the last data packet sent (simple ACKs are not considered data) and the first keepalive probe.
tcpMaxRtx	PositiveInteger	0..1	attr	Maximum number of times that a TCP segment is retransmitted before the TCP connection is closed. This parameter is only valid if tcpRetransmissionTimeout is configured. Note: This parameter also applies for FIN retransmissions.
tcpMsl	TimeValue	0..1	attr	Maximum segment lifetime in [s].
tcpNagleEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) support of Nagle's algorithm according to IETF RFC 1122 (chapter 4.2.3.4 When to Send Data). If enabled the Nagle's algorithm is activated per default for all TCP sockets, but can be deactivated per Socket (with the attribute TcpTp.nagle Algorithm).
tcpReceiveWindowMax	PositiveInteger	0..1	attr	Default value of maximum receive window in bytes.
tcpRetransmissionTimeout	TimeValue	0..1	attr	Timeout in [s] before an unacknowledged TCP segment is sent again. If the timeout is disabled, no TCP segments shall be retransmitted.
tcpSlowStartEnabled	Boolean	0..1	attr	Enables (TRUE) or disables (FALSE) support of TCP slow start algorithm according to IETF RFC 5681.
tcpSynMaxRtx	PositiveInteger	0..1	attr	Maximum number of times that a TCP SYN is retransmitted.
tcpSynReceivedTimeout	TimeValue	0..1	attr	Timeout in [s] to complete a remotely initiated TCP connection establishment, i.e. maximum time waiting in SYN-RECEIVED for a confirming connection request acknowledgement after having both received and sent a connection request.
tcpTtl	PositiveInteger	0..1	attr	Default Time-to-live value of outgoing TCP packets.

Table A.13: TcpProps

Class	UdpProps			
Package	M2::AUTOSARTemplates::SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology			
Note	This meta-class specifies the configuration options for UDP (User Datagram Protocol).			
Base	ARObject			
Aggregated by	EthTcpIpProps.udpProps			
Attribute	Type	Mult.	Kind	Note
udpTtl	PositiveInteger	0..1	attr	Default Time-to-live value of outgoing UDP packets.

Table A.14: UdpProps