Ranging

Service

RANGING (javadoc/org/arl/unet/Services.html#RANGING) – Ranging service

Agents offering the *Ranging* service provide time synchronization and ranging functionalities between pairs of nodes. They support a set of messages and parameters that are explained below.

Implementations

- Ranging (javadoc/org/arl/unet/phy/Ranging.html) – provides ranging using any Physical (svc-10-phy.html#svcphy) service with TIMESTAMPED_TX (javadoc/org/arl/unet/phy/PhysicalCapability.html#TIMESTAMPED_TX) capability

Requests and Responses

Request	Possible Responses	Description
RangeReq (javadoc/org/arl/unet/phy/RangeReq.html)	AGREE, FAILURE	Request range measurement
BeaconReq (javadoc/org/arl/unet/phy/BeaconReq.html)	AGREE, FAILURE	Request beacon transmission
ClearSyncReq (javadoc/org/arl/unet/phy/ClearSyncReq.html)	AGREE, FAILURE	Clear synchronization information
SyncInfoReq (javadoc/org/arl/unet/phy/SyncInfoReq.html)	SyncInfoRsp (javadoc/org/arl/unet/phy/SyncInfoRsp.html), FAILURE	Get synchronization information
ParameterReq (javadoc/org/arl/unet/ParameterReq.html)	ParameterRsp (javadoc/org/arl/unet/ParameterRsp.html)	Get/set/list parameters

Tip

An agent providing the ranging service typically responds to a RangeReq (javadoc/org/arl/unet/phy/RangeReq.html) agreeing to make the range measurement. The actual range measurement is sent later as a RangeNtf (javadoc/org/arl/unet/phy/RangeNtf.html).

Beacons are used for one-way travel-time (OWTT) ranging to transmit a timing signal that may be used by other modems to compute range from the beacon node. Only nodes that have valid synchronization to the beacon node obtain range information from beacon transmissions. Any range information recevied at a node is sent as an unsolicited RangeNtf (javadoc/org/arl/unet/phy/RangeNtf.html).

For OWTT to be used, synchronization information has to be first obtained between nodes. This automatically happens when a successful ranging exchange RangeReq (javadoc/org/arl/unet/phy/RangeReq.html) is made. The lifetime (javadoc/org/arl/unet/phy/RangeParam.html#lifetime) or validity of the synchronization information depends on the accuracy/drift of the clocks used in the modems.

Notifications

Notification	Topic	Description
RangeNtf (javadoc/org/arl/unet/phy/RangeNtf.html)	default	Range notification from a peer node
BadRangeNtf (javadoc/org/arl/unet/phy/BadRangeNtf.html)	default	Invalid range notification from a peer node
ParamChangeNtf (javadoc/org/arl/unet/ParamChangeNtf.html)	PARAMCHANGE (javadoc/org/arl/unet/Topics.html#PARAMCHANGE)	Notification about the modified parameter

Parameters

Parameter	r/w	Description
lifetime (javadoc/org/arl/unet/phy/RangeParam.html#lifetime)	rw	Life time or validity for synchronization information (seconds)
minRange (javadoc/org/arl/unet/phy/RangeParam.html#minRange)	rw	Minimum possible range (meters)
maxRange (javadoc/org/arl/unet/phy/RangeParam.html#maxRange)	rw	Maximum possible range (meters)
maxBadRangeCnt (javadoc/org/arl/unet/phy/RangeParam.html#maxBadRangeCnt)	rw	Maximum number of consecutive bad range estimates before discarding synchronization information for the node

Last updated on Oct 20, 2018.

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