Node Variations for PAGODA
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As of this date PAGODA has only one node type, which is implemented as the non-differentiated simulator MadRad. While MadRad has various operating modes from which the current mode or modes are chosen at random, it implements exactly the functionality with respect to knobs and sensors that the hardware abstraction layer (HAL) implements.

Node variations can be created which are less capable or more capable than the current MadRad implementation. We discuss these variations separately.

Less capable nodes are the simplest variation. They would have fewer knobs and/or sensors than the current MadRad. When HAL interacts with such nodes, setting a nonexistent knob would result in a no-op; reading a nonexistent sensor would result in an unknown (unk) reading. Other components, especially the Reasoner, have to accept unk sensor values.

More capable nodes may vary in two ways, which may be combined. First, they may have additional knobs and/or sensors beyond those currently defined. In this case, the interface with HAL could ignore those additions, or combine their setting with those of currently defined knobs. For example, a modulation knob could offer a setting with greater noise immunity but lower bandwidth than its alternative setting. This knob could be combined with the transmission power knob, such that when the latter is set high, the modulation knob would be set for greater noise immunity.

Additionally, knobs and sensors may allow finer resolution of setting or reading respectively than the binary values currently used. For example, a signal strength sensor could provide readings on a 1-10 scale rather than the current pro/con values. This could be handled by a thresholding function in the HAL/MadRad interface that, for example, assigned 1-5 to con and 6-10 to pro.

As PAGODA evolves, it is preferable that it take advantage of more capable nodes. This could be done by extending the HAL interface to include more knobs and sensors and/or finer resolution in their settings and readings or by having the Reasoner negotiate options with each node through HAL and making direct use of the greater capabilities of appropriate nodes.

Current Model
Knobs: TransPwr TransFreq PktSize Compression TransportWind ECC RoutingUpdate QueRetention Encryption Caching SoftState DirectionalTrans CastingSpecificity
Sensors: BattLevel ProcIdle RamUse SignalStr BER PktLossRate Interference Multipath ConnLoss Throughput EnvConditions

Less capable node example:
(Cellphone-like)
Knobs: TransPwr PktSize CastingSpecificity
Sensors: BattLevel SignalStr

More capable node example:
Knobs: current knobs plus modulation technique, channel choice, node location (can move the node), transport protocol algorithm, antenna direction.
Add fine resolution settings to: TransPwr TransFreq PktSize ECC QueRetention Encryption Caching NodeLocation AntennaDirection
Sensors: current sensors plus location.
Add fine resolution readings to all sensors.