An Integrated OMNeT++ Implementation of 802.11

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• Inet framework already includes several 802.11 transmission modes but implemented as separate models (802.11b,g,a,e,...)
→ Related problems:
  o Replication of the same code
  o Increase of the cost of maintaining and upgrading: any patch must be independently added to all implementations.
• Goal: to reorganize the code to integrate all the versions
  o Correct errors
  o Add new functionalities
• New module based on 802.11e/g model present in inetmanet and the Wi-Fi module available for NS-3 simulator (in turn derived from the implementation for YANS simulator)
2 new classes:

- **ModulationType**: a structure with parameters describing the employed modulation
- **WiFiModulationType**: to fill the fields of the ModulationType class. It offers a series of classes that enable the computation of the transmission time of the frames and headers of the Physical Layer.

- Different models for bit error probability have been incorporated (Yans, Nist, Table-based)
### Fields for the characterization of a transmission mode

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>isMandatory</td>
<td>It indicates if the mode is designed as mandatory by the standard</td>
</tr>
<tr>
<td>bandwidth</td>
<td>Bandwidth (in MHz) utilized by each channel.</td>
</tr>
<tr>
<td>codeRate</td>
<td>Number of encoded bits per symbol</td>
</tr>
<tr>
<td>dataRate</td>
<td>Binary rate</td>
</tr>
<tr>
<td>phyRate</td>
<td>Speed of the physical layer, expressed in symbols per second</td>
</tr>
<tr>
<td>constellationSize</td>
<td>Constellation size of the modulation scheme</td>
</tr>
<tr>
<td>modulationClass</td>
<td>Type of modulation</td>
</tr>
</tbody>
</table>
Implementation: Link Layer

• 802.11e QoS is now supported
• Two new configurable modules for classifying & queuing packets
• Management packets are prioritized
• Multi-queue classifier module for every traffic category (strict priority or Weighted Round Robin)
• Arbitrary number of classes/queues
Future extensions

- Algorithms to adapt binary rates
- Block-ACK mechanism
- New models for interference