

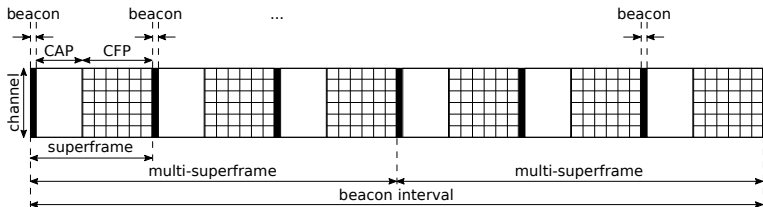
A Remote Interface for Live Interaction with OMNeT++ Simulations

Maximilian Köstler and Florian Kauer

OMNeT++ Community Summit 2017

September 8th, 2017

Motivation - IEEE 802.15.4 DSME



DSME promises wireless multi-hop communication without collisions.



M. Köstler, F. Kauer, T. Lübker, V. Turau, *Towards an Open Source Implementation of the IEEE 802.15.4 DSME Link Layer*.

Proceedings of the 15. GI/ITG KuVS Fachgespräch Sensornetze, 2016



F. Kauer, M. Köstler, T. Lübker, V. Turau, *openDSME - A Portable Framework for Reliable Wireless Sensor and Actuator Networks*.

Demonstration at the International Conference on Networked Systems, 2017

An Interactive Demonstration

The screenshot displays the OMNeT++ simulation environment. The main window shows a network diagram with a central 'Net802154MultiGateway' and a 'radioMedium' component. A cluster of nodes is visible, labeled with host IDs from 8 to 18. The interface includes a menu bar (File, Simulate, Inspect, View, Help), a toolbar with simulation controls, and a status bar at the bottom.

The 'Contents (22)' table lists the objects in the simulation:

Fields	Class	Name	Info
	HostWrapper	host[6]	id=8
	HostWrapper	host[7]	id=9
	HostWrapper	host[8]	id=10
	HostWrapper	host[9]	id=11
	HostWrapper	host[10]	id=12
	HostWrapper	host[11]	id=13
	HostWrapper	host[12]	id=14
	HostWrapper	host[13]	id=15
	HostWrapper	host[14]	id=16
	HostWrapper	host[15]	id=17
	HostWrapper	host[16]	id=18
	HostWrapper	host[17]	id=19
	HostWrapper	host[18]	id=20
	lee802154Narro	radioMedium	id=21
	cCanvas	canvas	1 toplevel figure(s)

CSMA #0: Net802154MultiGateway - scaled real-time scheduling (1x) Msg stats: 38 scheduled / 212 existing / 436 created Zoom: 0.35x

An Interactive Demonstration

An Interactive Demonstration

The OMNeT++ GUI is made for *developing* and not for *presenting*.

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- Very detailed information
- Deep menu trees
- Attached to a single simulation

An Interactive Demonstration

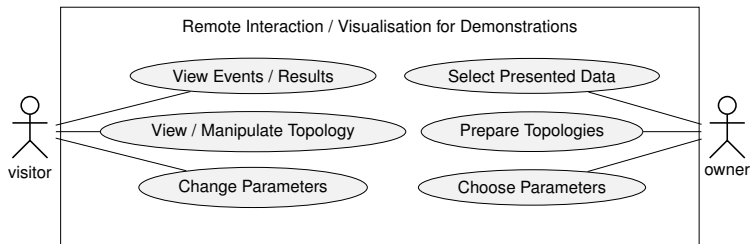
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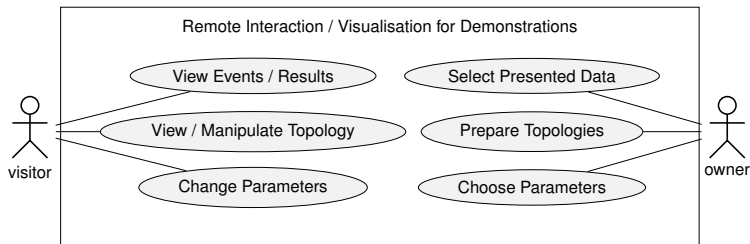
⇒ Not designed for demonstrations

⇒ Can not aggregate live data from multiple sources

Requirements

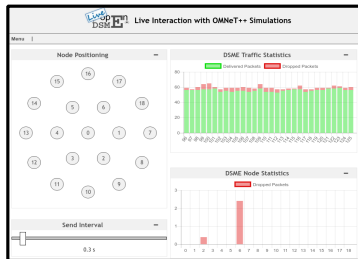
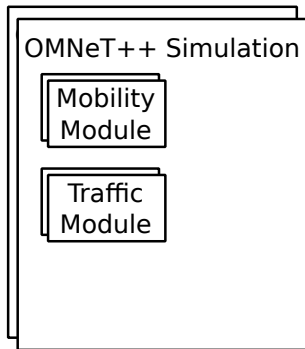


Requirements

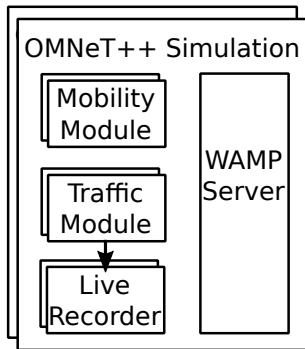


- Merge data from multiple simulations
- Move interface to different (possibly mobile) device

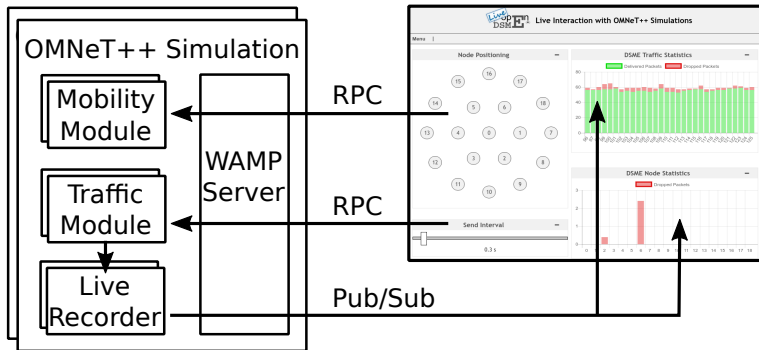
Software Architecture



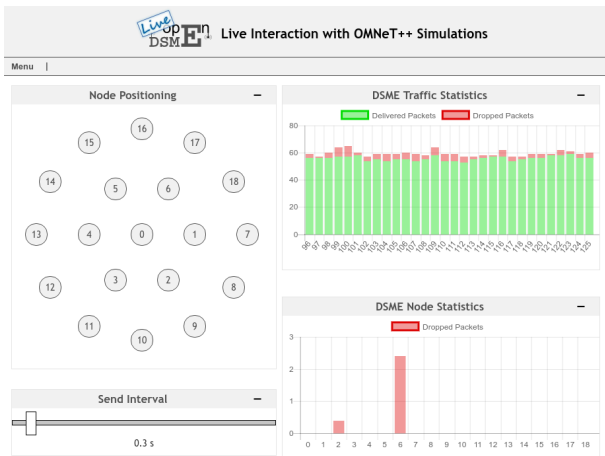
Software Architecture




Software Architecture



Simple and Modular User Interface



Contribution

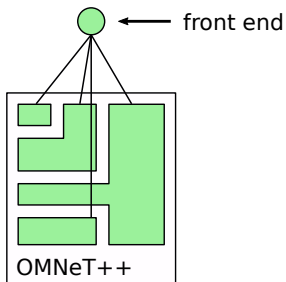
- Framework for exchanging data between OMNeT++ simulations and front ends
- Uses existing protocols (WAMP)
- Enables modular GUI based on web technology
-  Repositories at <https://github.com/openDSME/>
 - ◆ `opplive`
 - ◆ `inet-dsme`

Discussion

- Could be done the same way for any other simulator
- Goal: Move functionality into OMNeT++
- Introduce generic result recording and parameter manipulation

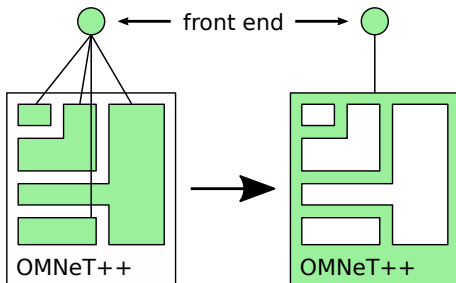
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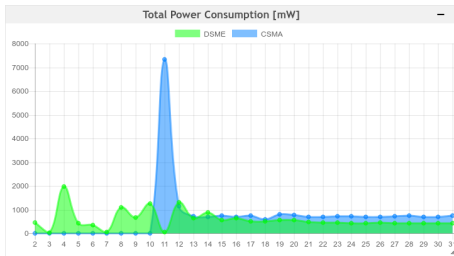


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```
<div id="power_chart_container" class="draggable ui-widget-content">
  <div class="handle"><h2>Total Power Consumption [mW]</h2></div>
</div>
```

```
<script>
var dsme_wsuri = "ws://localhost:9002";
var csma_wsuri = "ws://localhost:9003";

var power_statistics = new PowerStatisticsModule(
  "power_chart_container",
  [dsme_wsuri, csma_wsuri],
  ["DSME", "CSMA"]);
```

```
</script>
```