

CORNER: a Realistic Urban Propagation Model for QualNet

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I. CORNER INSTALLATION GUIDE

The CORNER model is implemented in the two files `prop_corner.cpp` and `prop_corner.h`. These two files need to be included in the directory `$QUALNET_HOME/libraries/wireless/src/`.

The two files:

```
$QUALNET_HOME/libraries/wireless/src/propagation.cpp
```

```
$QUALNET_HOME/include/propagation.h
```

need to be replaced with the modified version provided with CORNER.

Finally the following line needs to be added to the file `$QUALNET_HOME/libraries/wireless/Makefile-common`:

```
$(WIRELESS_DIR)/prop_corner.cpp \
```

II. CORNER USER GUIDE

To use the CORNER model, the following line must be included in the QualNet configuration file:

```
PROPAGATION-PATHLOSS-MODEL CORNER
```

As discussed before the CORNER model requires knowledge of the underlying road network. The road network must be input using two files describing the intersections and the road segments.

The intersections file is specified through the following option in the QualNet configuration file:

```
PROPAGATION-CORNER-NODES-FILE <File Location>
```

The first line of the intersections file must contain the total number of intersections in the file. Then each following line must refer to a single intersection and contain the ID number of the intersection and X and Y coordinates of the intersection. In the following is reported how the intersection file should be formatted:

```
<Number of Intersections>
```

```
<Intersection ID> <X> <Y>
```

```
:
```

The road segments file is specified through the following option in the QualNet configuration file:

```
PROPAGATION-CORNER-LINKS-FILE <File Location>
```

The first line of the road segments file must contain the total number of road segments in the file. Then each following line must refer to a single road segment and contain: the ID of the intersection where the segment starts, the ID of the intersection where the segment ends and the number of lanes. For future extension the line must contain three more elements that are useless at the moment. These elements are: a boolean value telling if the segment is on the border of the map; the vehicle flow on the road segment; the speed limit on the segment in *m/s*. If the value of this elements is unknown they can be replaced by 0. In the following is reported how the road segments file should be formatted:

```
<Number of Segments>
```

```
<Intersection A> <Intersection B> <Number of Lanes> <Border Segment> <Flow> <Speed>
```

```
:
```

These two files can be easily extracted from the TIGER maps using VMF. VMF in mode 1 returns two files: `outNodes.data` and `outLinks.data` that are already in the right format.

REFERENCES

- [1] Q. Sun, S. Y. Tan, and Kah C. Teh. Analytical formulae for path loss prediction in urban street grid microcellular environments. *IEEE Transactions on Vehicular Technology*, 54(4):1251–1258, July 2005.
- [2] Scalable-Networks. Qualnet network simulator. <http://www.scalable-networks.com>.