

# LoRaWAN Demo

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June 27, 2019

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## 1 Network Topology

### 1.1 Variable number of EDs

### 1.2 One GW

### 1.3 Various propagation options

### 1.4 Confirmed / Unconfirmed traffic

## 2 Baseline example

### 2.1 A simple UL only network with 200 devices

Each device will send one packet, at a random time during the simulation.

```
./waf --run "complete-network-example" | tail -n 15
```

PHY

---

TOT: 200

SUCC: 200

INT: 0

NMR: 0

US: 0

GWTX: 0

MAC Confirmed

-----

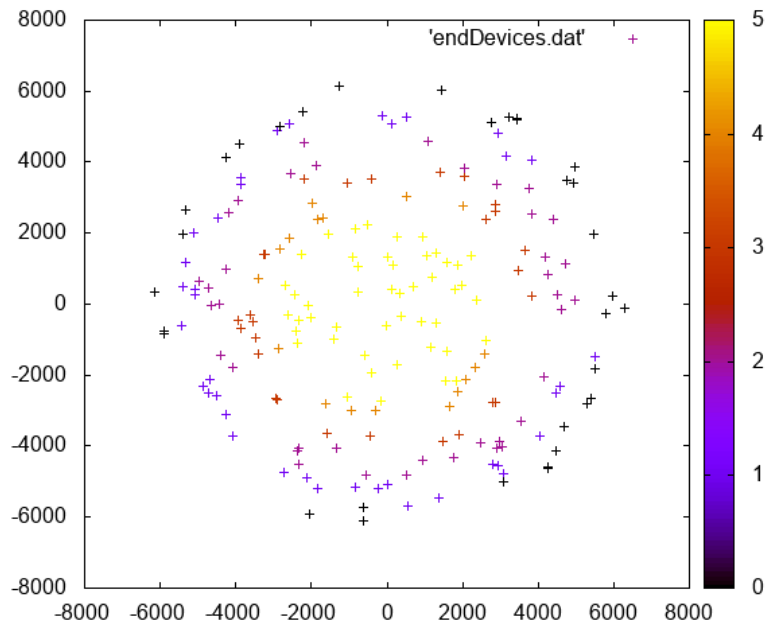
Successes: 0 0 0 0 0 0 0 0

Failures: 0 0 0 0 0 0 0 0

Delays: 0 0

Totals: 0

```
gnuplot -p -e "set term png; set output 'eds1.png'; \  
plot 'endDevices.dat' with points palette"
```



## 2.2 More devices!

```
./waf --run "complete-network-example --nDevices=1000" | tail -n 15
```

PHY

---

TOT: 1000

SUCC: 899

INT: 91

NMR: 10

US: 0

GWTX: 0

MAC Confirmed

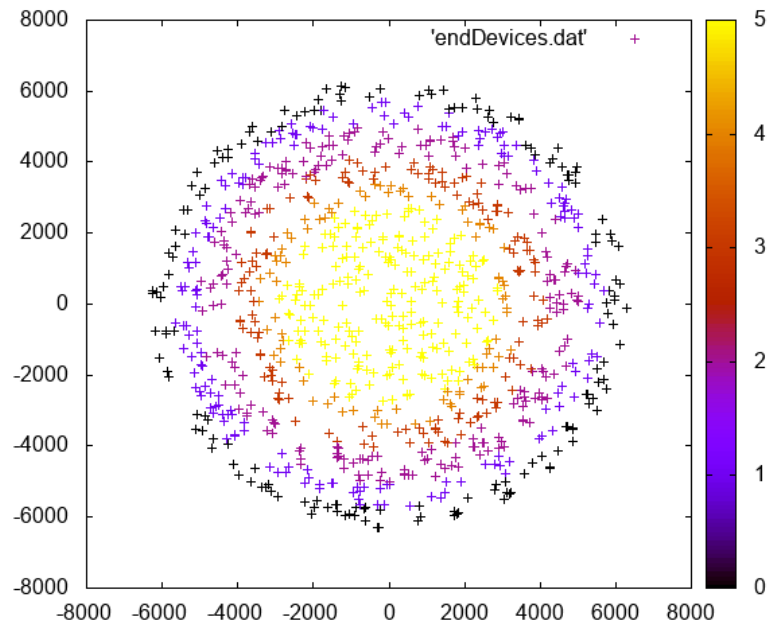
-----

Successes: 0 0 0 0 0 0 0 0

Failures: 0 0 0 0 0 0 0 0

Delays: 0 0

Totals: 0



### 3 Impact of channel model

Previously, we used a 'gentle' propagation model. With buildings and shadowing, instead...

```
./waf --run "complete-network-example --addBuildings=True" | tail -n 15
```

PHY

---

TOT: 200

SUCC: 81

INT: 3

NMR: 0

US: 116

GWTX: 0

MAC Confirmed

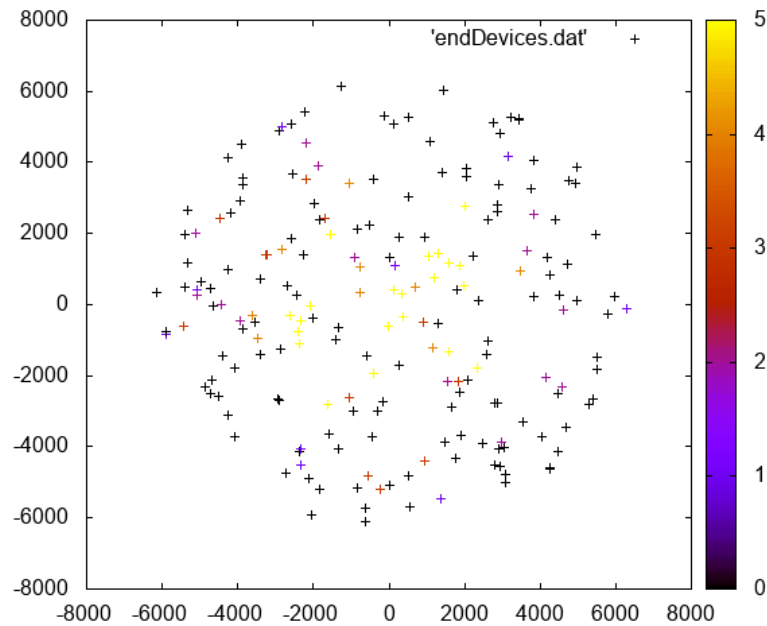
-----

Successes: 0 0 0 0 0 0 0 0

Failures: 0 0 0 0 0 0 0 0

Delays: 0 0

Totals: 0



## 4 Unconfirmed / Confirmed

When EDs require confirmation, the GW will need to reply with an ACK.

```
./waf --run "complete-network-example --MType=Confirmed" | tail -n 15
```

PHY

---

TOT: 259

SUCC: 203

INT: 1

NMR: 0

US: 0

GWTX: 55

MAC Confirmed

-----

Successes: 157 32 7 3 1 0 0 0

Failures: 0 0 0 0 0 0 0 0

Delays: 30.0995 31.4437

Totals: 259

With too many devices, we get congestion!

```
./waf --run "complete-network-example --MType=Confirmed --nDevices=600" | tail -n 15
```

PHY

---

TOT: 1246

SUCC: 630

INT: 51

NMR: 7

US: 0

GWTX: 558

MAC Confirmed

-----

Successes: 336 109 61 32 26 13 11 7

Failures: 0 0 0 0 0 0 0 5

Delays: 110.524 112.697

Totals: 1246