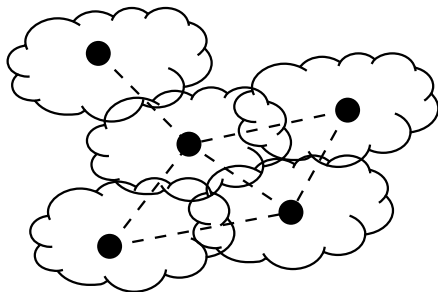


# Implementation of Energy Aware Queue Management Algorithm for Maemo

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## Mesh network on mobile devices

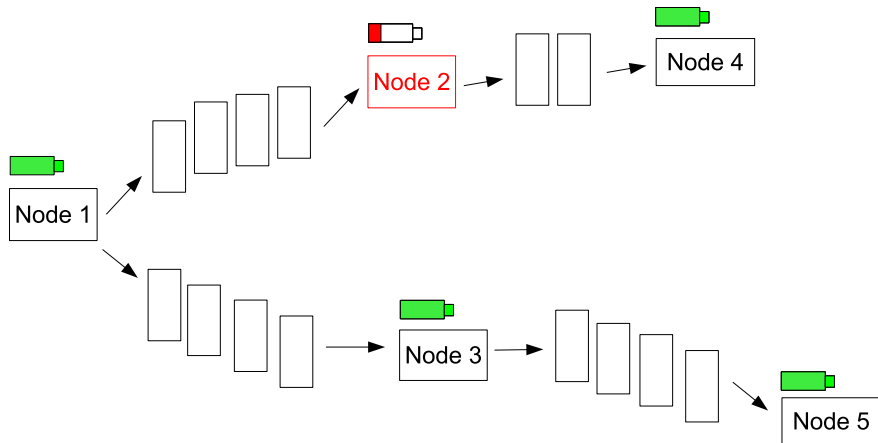


- Nodes are mobile devices
- Every node forwards packets from another nodes
- Battery charge is limited

How to save energy  
and  
do not change the basic network protocols?

# Solution Idea

Drop packets when battery level is low



# Solution Idea

Which packets could be dropped?

- UDP, VoIP traffic

What we get?

- Call duration becomes longer
- Voice quality is lower, but we can still understand
- Changes affect only particular nodes with low battery

## Testbed description



- There are two computers with Linphone (PC1 и PC2)
- All traffic between PC1 и PC2 goes through N900

### Algorithm

```
if (battery level > X)  
    drop packets with probability P
```

# Requirements

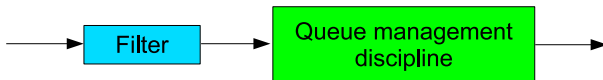
- Get battery status
- Have a deal with packets queue
  - ▶ Divide all traffic on VoIP and not VoIP
  - ▶ Implement packets drop

## QoS subsystem

QoS disabled (usual case)

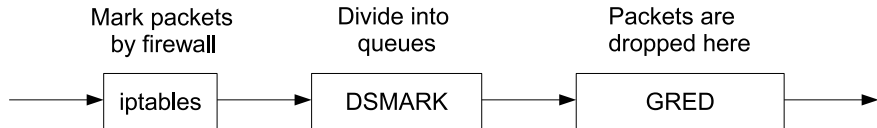


QoS enabled



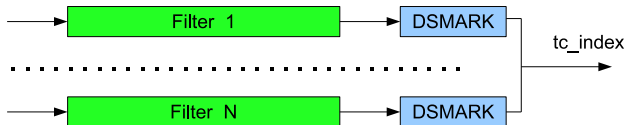


## QoS usage

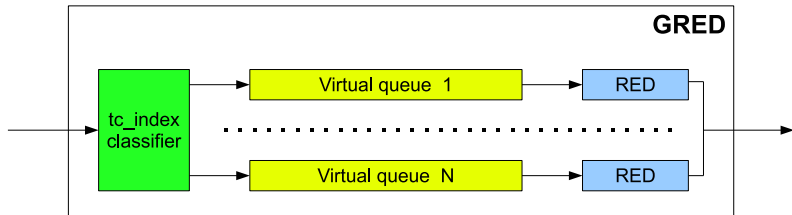


# Queues structures

- DSMARK is for filtering



- GRED



# Implementation on Maemo

- Set queues
  - ▶ Enable QoS in Maemo kernel (CONFIG\_NET\_SCHED option)
  - ▶ Install iproute2 (tc — a tool for queue management)
  - ▶ Install iptables (mark packets by firewall)
- Filter VoIP traffic
  - ▶ For Linnphone port number was used(7078)
- Modify GRED in order to get EAED
  - ▶ The threshold for packets drop depends on current battery status

# Getting battery status

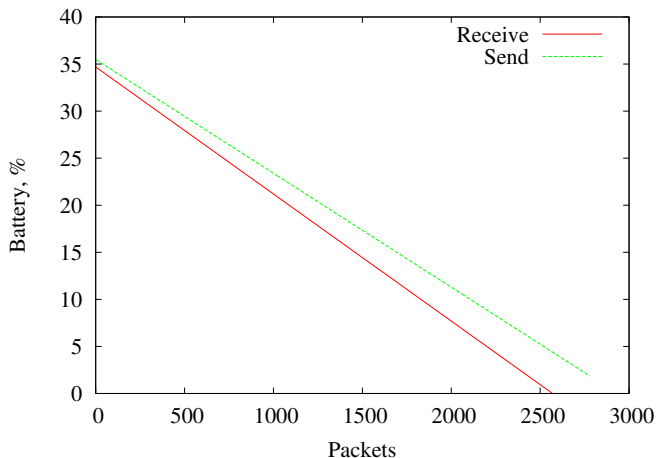
- Use battery-status tool
- battery-status -> Proc FS
- Proc FS -> kernel module

## Nearest purposes of research

- What is the maximum acceptable drop rate?
  - ▶  $P = 0.2$  (PESQ characteristic was used)
- What is the battery life saving at maximum drop rate?
  - ▶ In progress

## Intermediate results

Reception takes 10% more energy than transmission



Thank you for attention!