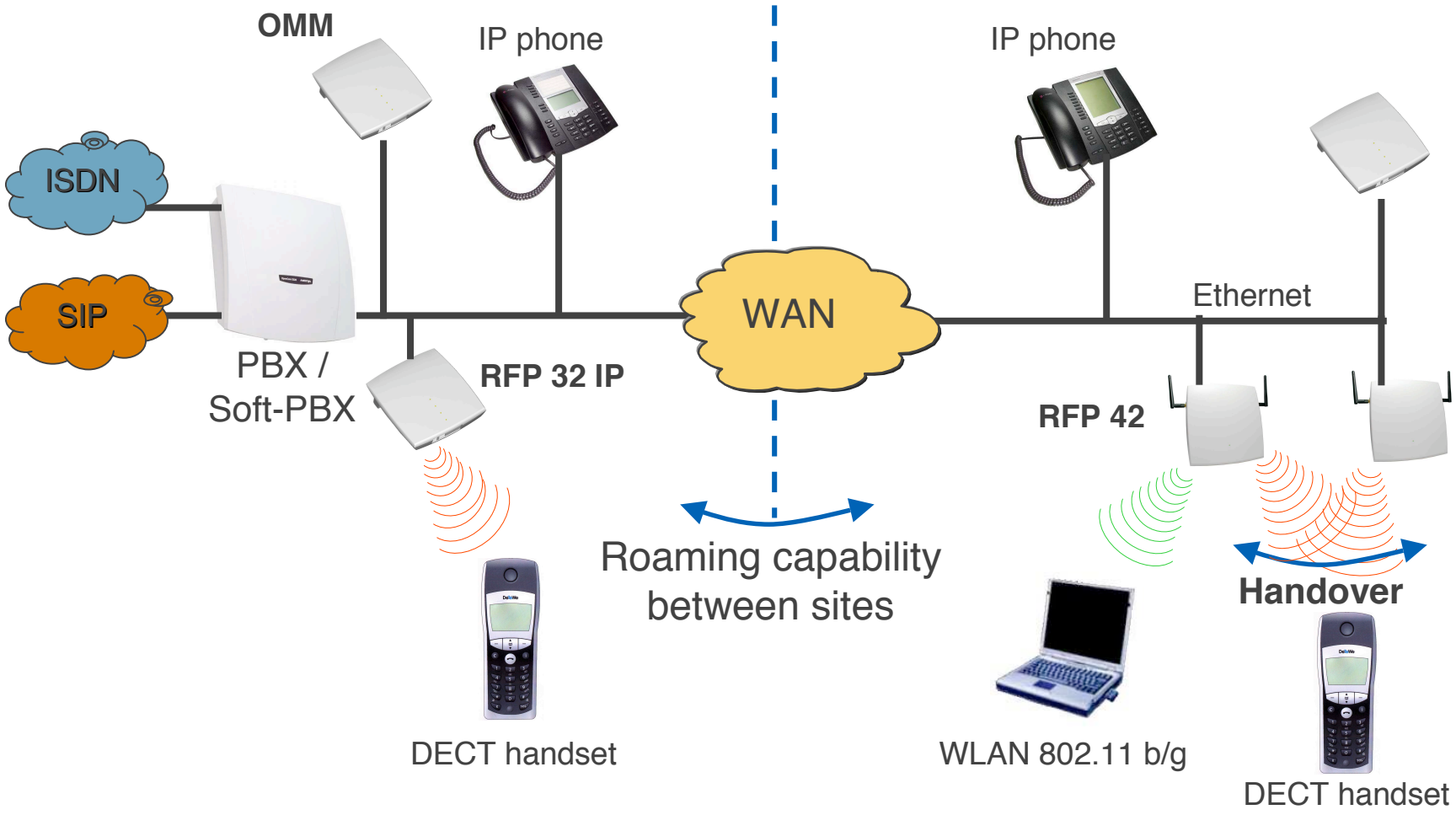
DECT over SIP

Basic Training

TOC: Basic Training

- DECT over IP overview
- DECT IP base station types
- OpenMobility Manager
- Handover
- Sync over AIR
- Media-stream Management
- Start-UP RFP 3x
- Configuration
- Power over Ethernet
- Quality of service
- DECTNet Monitor
- Syslog

DECT over IP - Overview



DECT over SIP Products

ROHS compliant

RFP L32 IP

DECT indoor

RFP L34 IP

DECT outdoor

142d

DECT handset

IP-DECT Base Station

IP-RFP 32

Voice mobility (DECT-features)

- Usage of all 12 channels between base station and handset
- 8 simultaneous voice channels on each DECT- base station, additional 4 channels e.g for location registration
- Synchronisation of IP-RFP over DECT
- Support of GAP-standard
- Connection handover
- DSAA authentication between base station and handset
- DSC-64bit-encryption over the air interface
- Status LED for operation with 4 LEDs (red / yellow / green)

IP-DECT Base Station

RFP 34 IP

Voice mobility (IP-features)

- Physical connection to Ethernet 10/100 BaseT
- Power supply according to Power over Ethernet Standard IEEE 802.3af
- VoIP-connection with protocol RTP/RTCP
- Network boot, SW-download / update via TFTP
- DHCP client
- Codec G.711/G.723/G.729 depending on the required voice quality and available bandwidth
- Support of quality of service with Diffserv / ToS-flag
- Adaptive jitter compensation
- Echo cancellation / suppression for acoustic and transmitted echo
- Voice pause cancellation und call-familiar noise-generation
- VLAN tagging

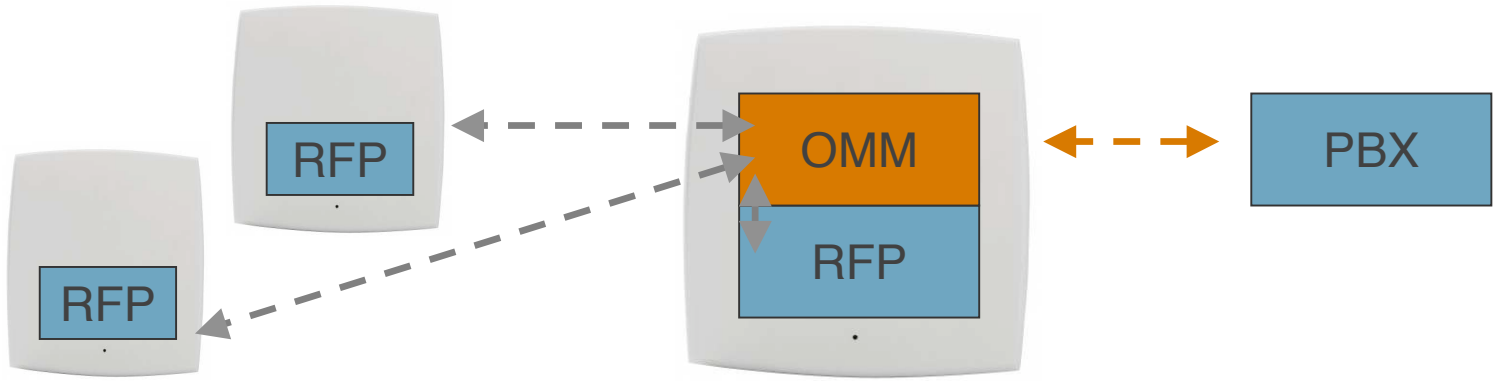
OpenMobility Manager (OMM)

A DECT over IP system is controlled via an OpenMobility Manager.

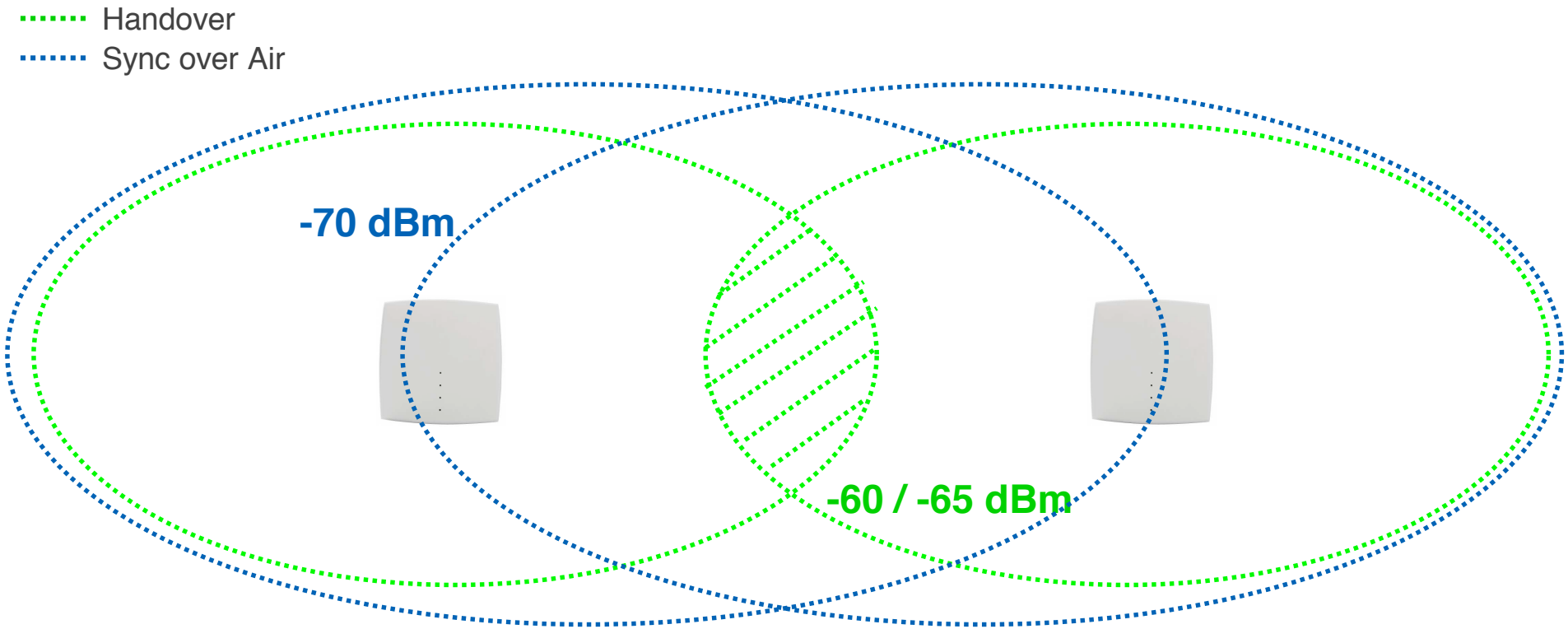
This program is started with the insertion of the OMM IP address on a RFP 3x IP.
Additional base stations connect to the OMM.

The OMM maintain a connection to each base station and has control over them.

A signalling connection to the PBX is only effected by the OMM.



Handover



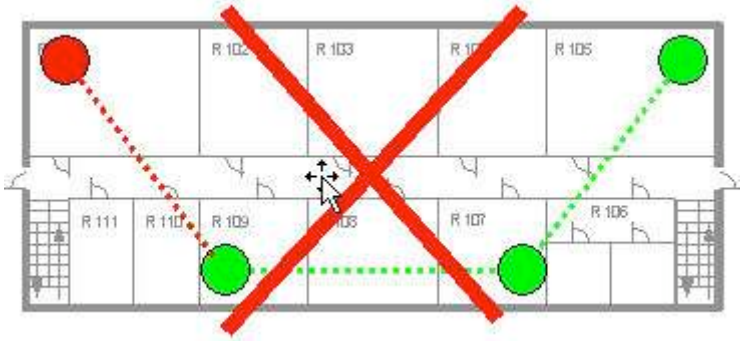
The field strength threshold values between neighbouring RFP‘s needs to be –60 dBm till max. –65 dBm.

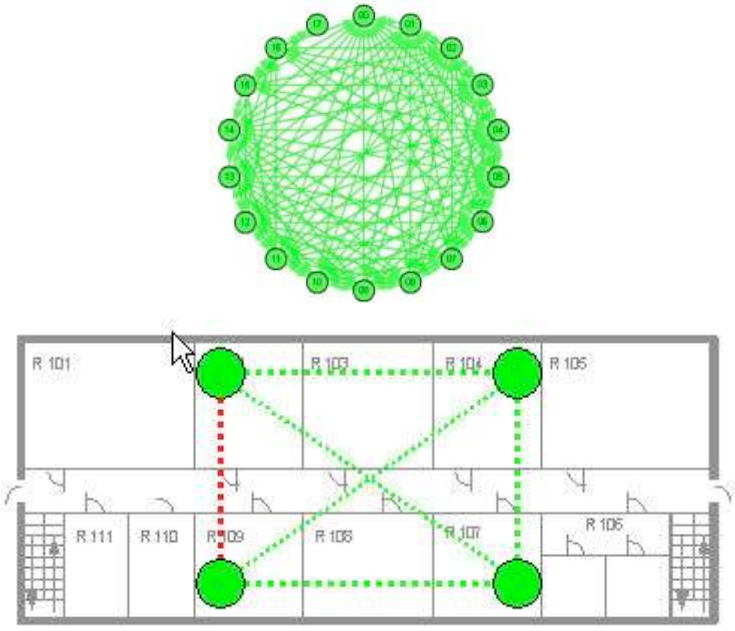
SYNC OVER AIR

DECT IP synchronizes itself via air interface.

RFP‘s that can recognize each other via the air interface are linked into one cluster.

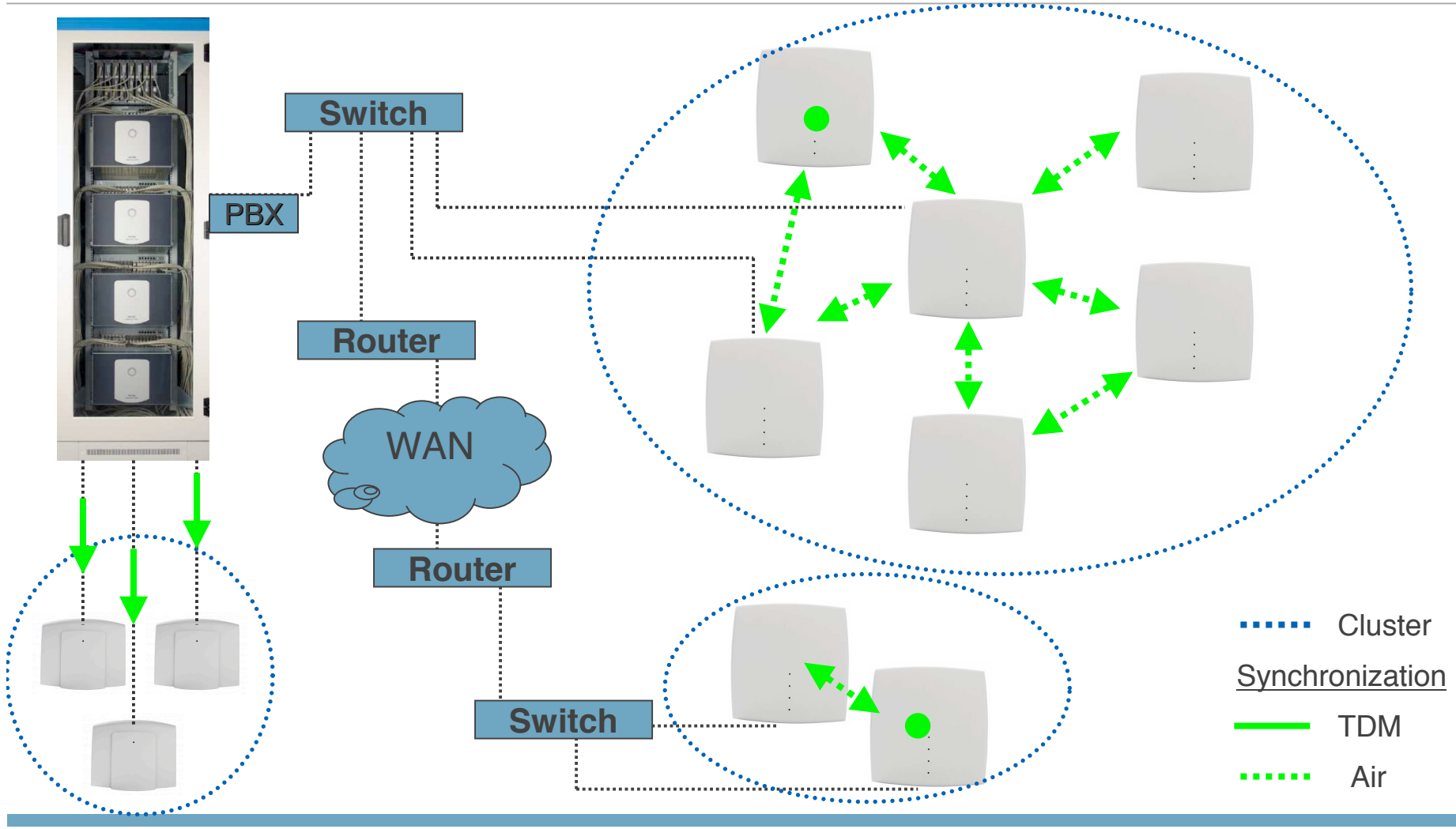
It is possible to set up several clusters, however without handover between them.



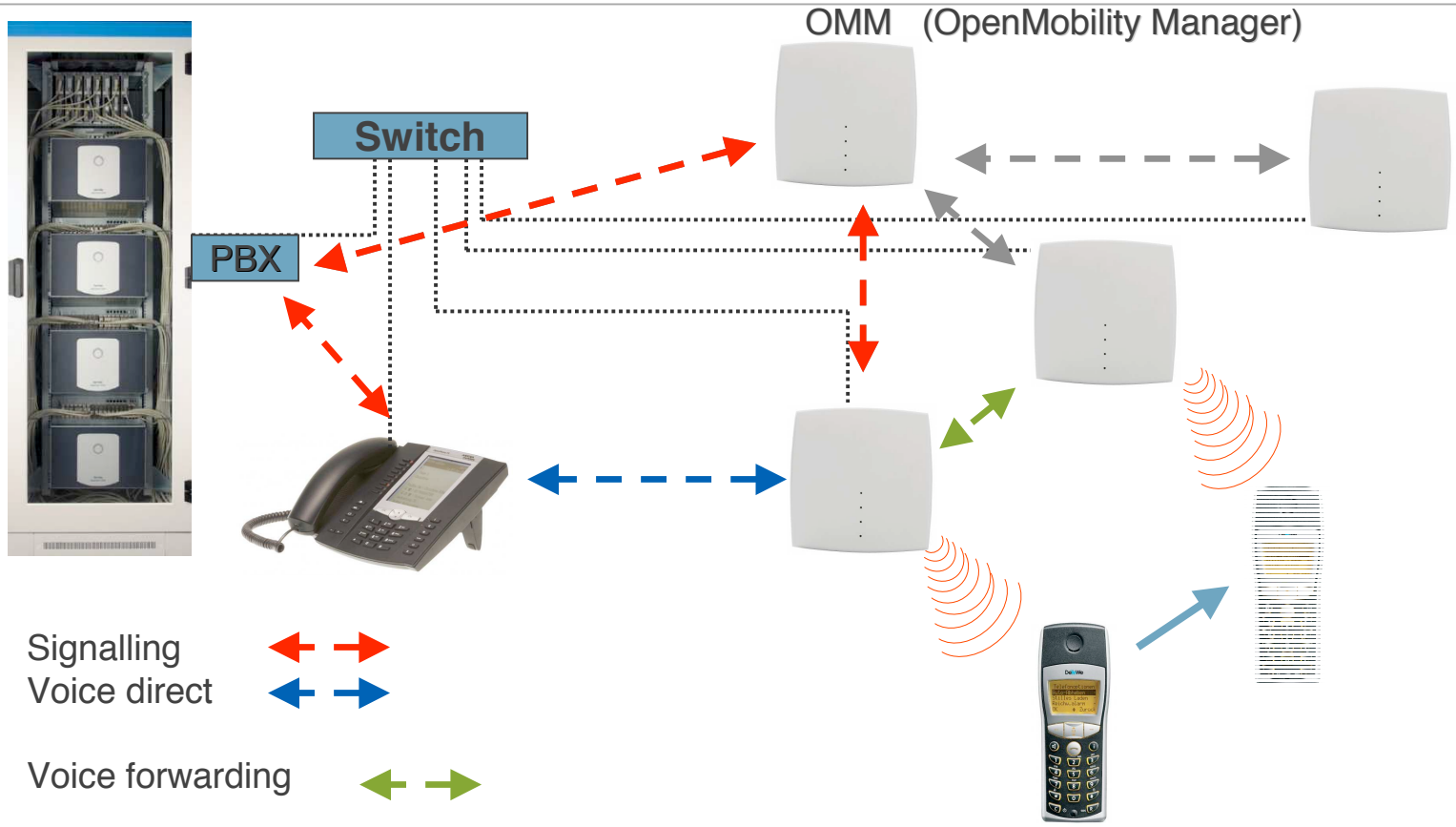


The required field strength for Sync over Air is -70 dBm

Synchronization



Media Stream Manager (MSM)



When a terminal changes the base station during a call, the voice data is re-directed between the RFP's. There is a direct connection established between the foregoing and the current RFP.

Media Stream Manager (MSM)

- A base station offers 12 IP- and 8 DECT connection resources, which are dynamicly allocated for a connection.

- One IP resource (direct or re-directed) and one DECT resource are required for one call.

```
| state              | local
| codec / vif / vad  | G711 aLaw / 20 ms / no
| tone               | no
| downstream         | 172.29.1.151:xxxxx => 16368 -> DSP
| upstream           | 172.29.1.151:10080 <= 16368 <- DSP
```

- After a handover the former used base station still requires one IP-resource, the DECT connection on the former used base station is stooped.

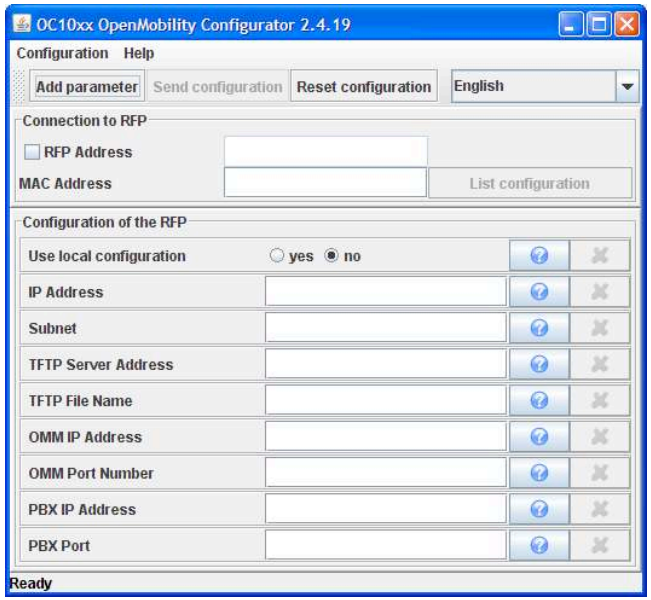
```
| state              | redirect
| call_id            | 31303
| downstream         | 172.29.1.151:xxxxx => 16368->16370 => 10.103.50.214:16380
| upstream           | 172.29.1.151:10080 <= 16368<-16370 <= 10.103.50.214:16380
```

- The active base station requires one DECT- an one IP-resource.

RFP 3x IP Ramp-Up

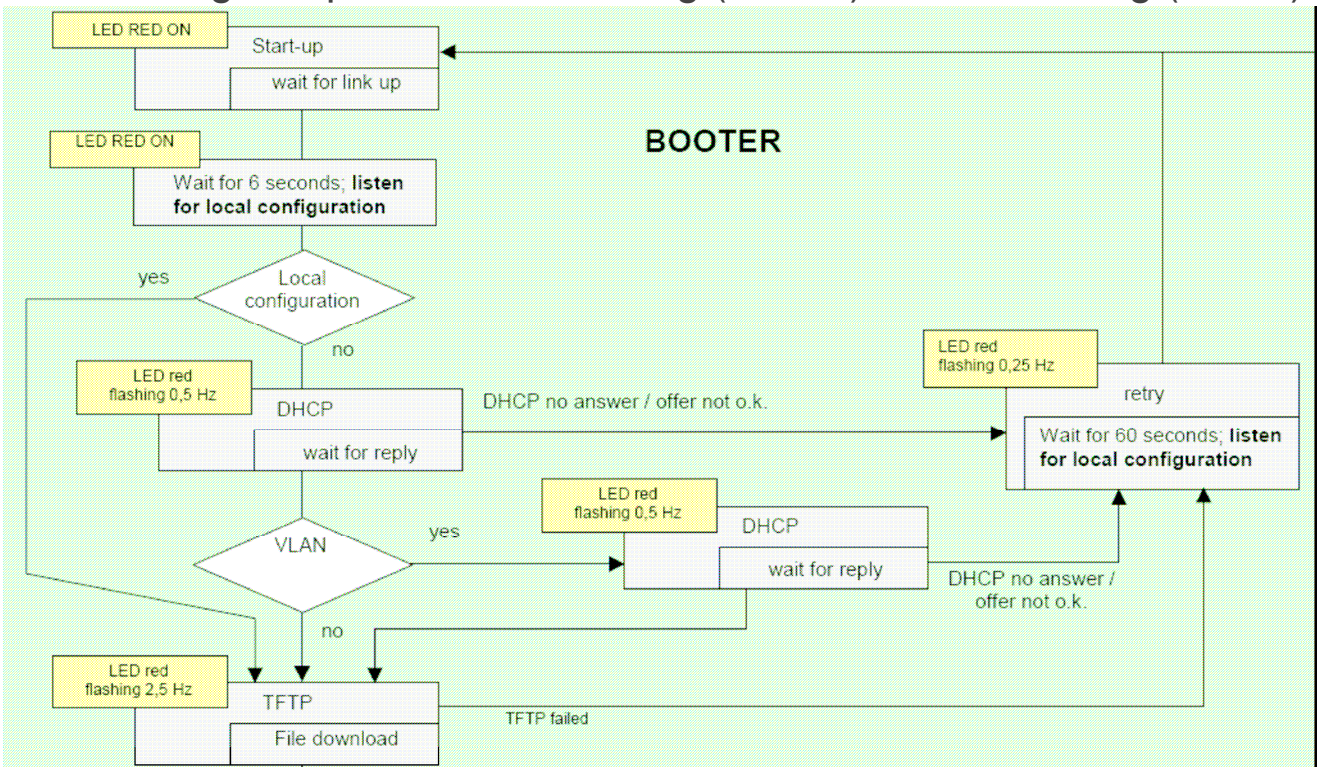
A DHCP-server or a permanent network configuration in the base station
(stored by OpenMobility Configurator) are necessary
for making the IP base stations operational.

For downloading the software image a TFTP-server is required.



RFP 3x IP Ramp-Up

1: Red LED lights up -> normal blinking (0.5 Hz) -> fast blinking (2.5Hz)



2: Orange LED lights up
3: Green LED blinks until a function has been allocated
4: Green LED lights up when operational

Configuration DECT over SIP

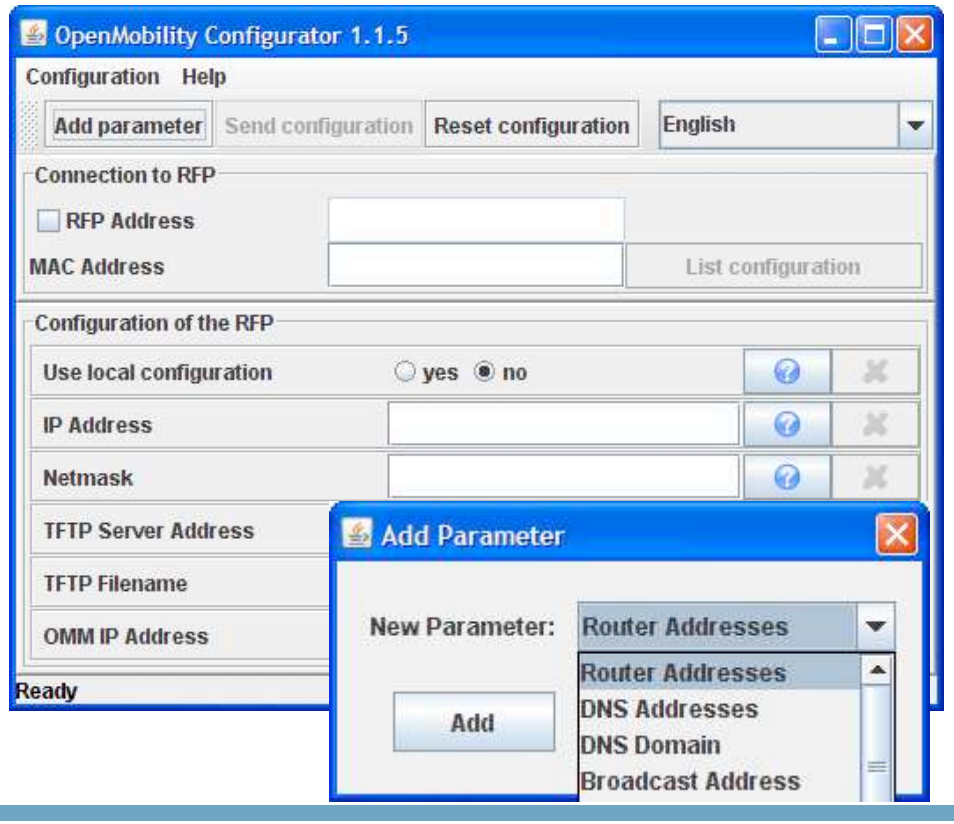
DECT over SIP

Ramp-Up of the Base Stations – Permanent Configuration

Required network parameters of the base stations

can be stored onto a permanent flash memory with the OpenMobility Configurator

or sourced via DHCP over the network.



Required options:

IP-address, Subnet mask, TFTP-server,

TFTP-file, OMM-IP-address

Optional facilities: (add paramenter)

Gateway, DNS, VLAN, NTP,

Country Code

Ramp-Up of the Base Stations - DHCP

A DHCP client is embedded in the booter of the base station, which initiates requests to the DHCP server in the network. The DHCP client only accepts answers that fulfil the following conditions:

Option 224 includes “OpenMobility“ or the boot file name includes “ip_rfp.cnt“.

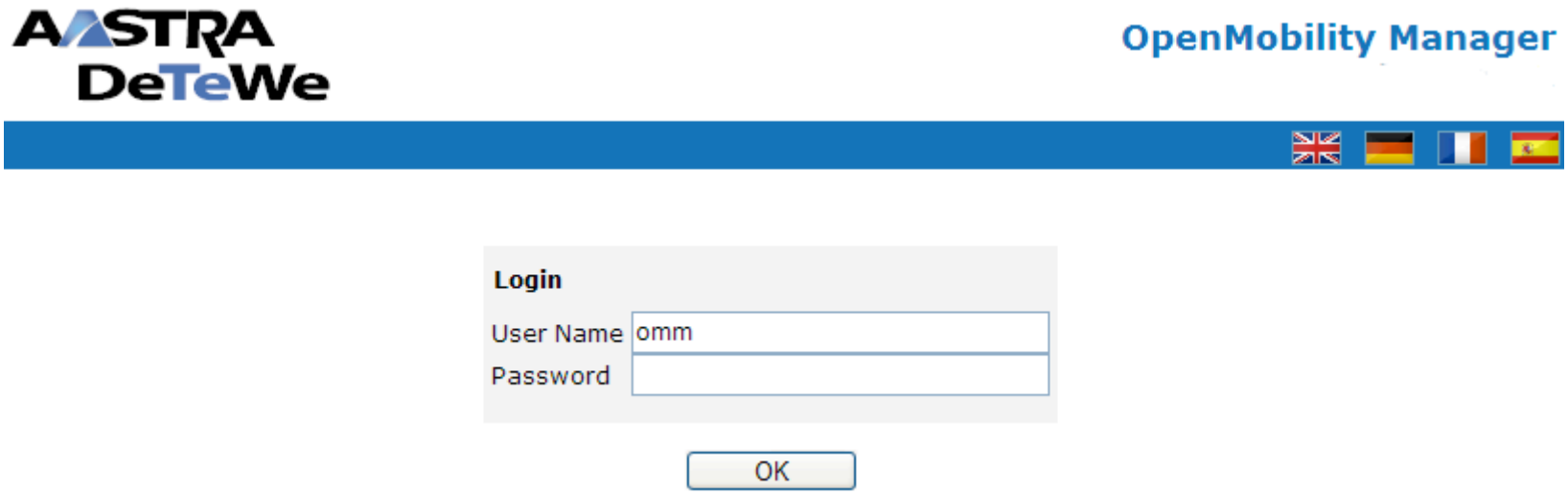
Option 43 Vendor-Specific Information ist set. Example in hex:
“0A:04:XX:XX:XX:XX“ (XX:XX:XX:XX = IP-address of the OpenMobility Manager)

<u>Required parameter:</u>
IP-address, Subnet mask, gateway
boot file name, next file server,
Option 43: code 10 OMM IP-address

Option Name	Vendor	Value
003 Router	Standard	192.168.111.254
006 DNS Servers	Standard	192.168.111.254
043 Vendor Specific Info	Standard	0a 04 c0 a8 6f 0b
066 Boot Server Host Name	Standard	192.168.111.254
067 Bootfile Name	Standard	omm_ffsip.tftp
224 Public Option 224	Standard	OpenMobility

<u>Optional parameter:</u>
Option 42 NTP, Domain Name Server
Option 43: code14 Syslog Server IP, code15 Syslog Port, code17 country code

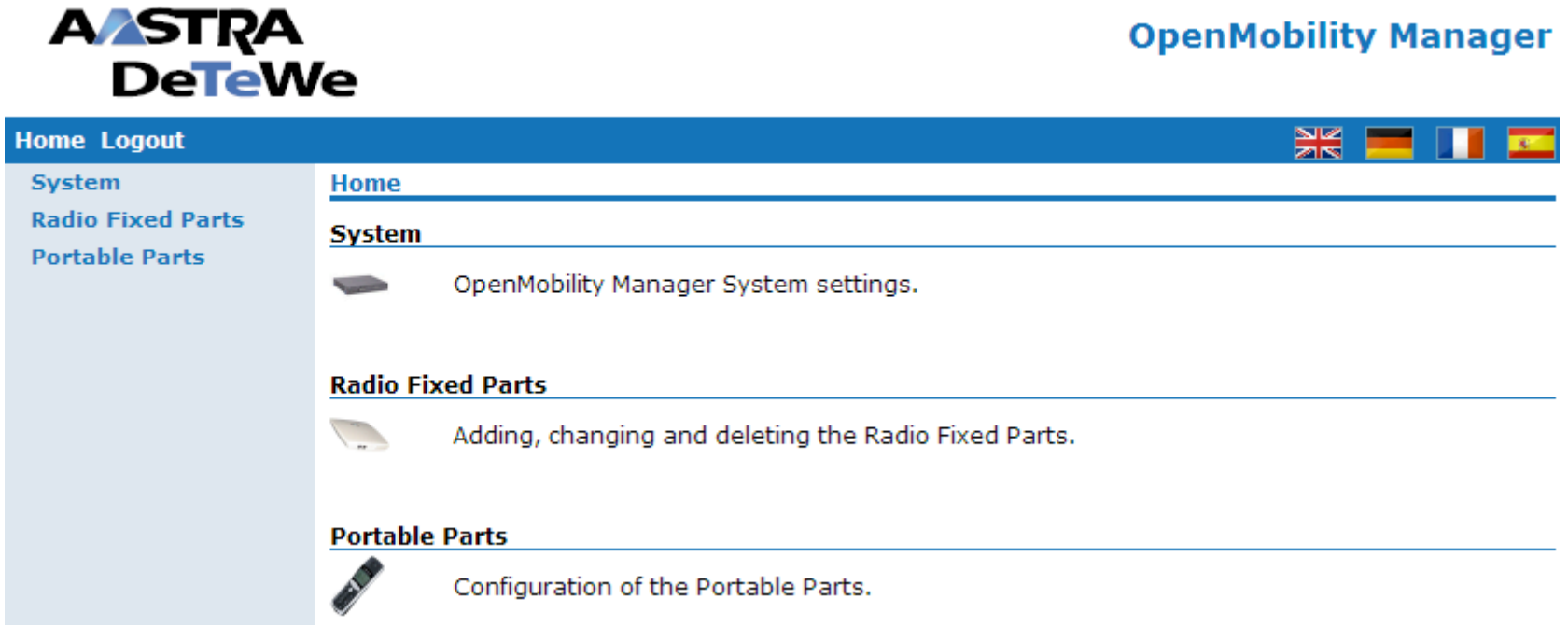
OpenMobility Manager



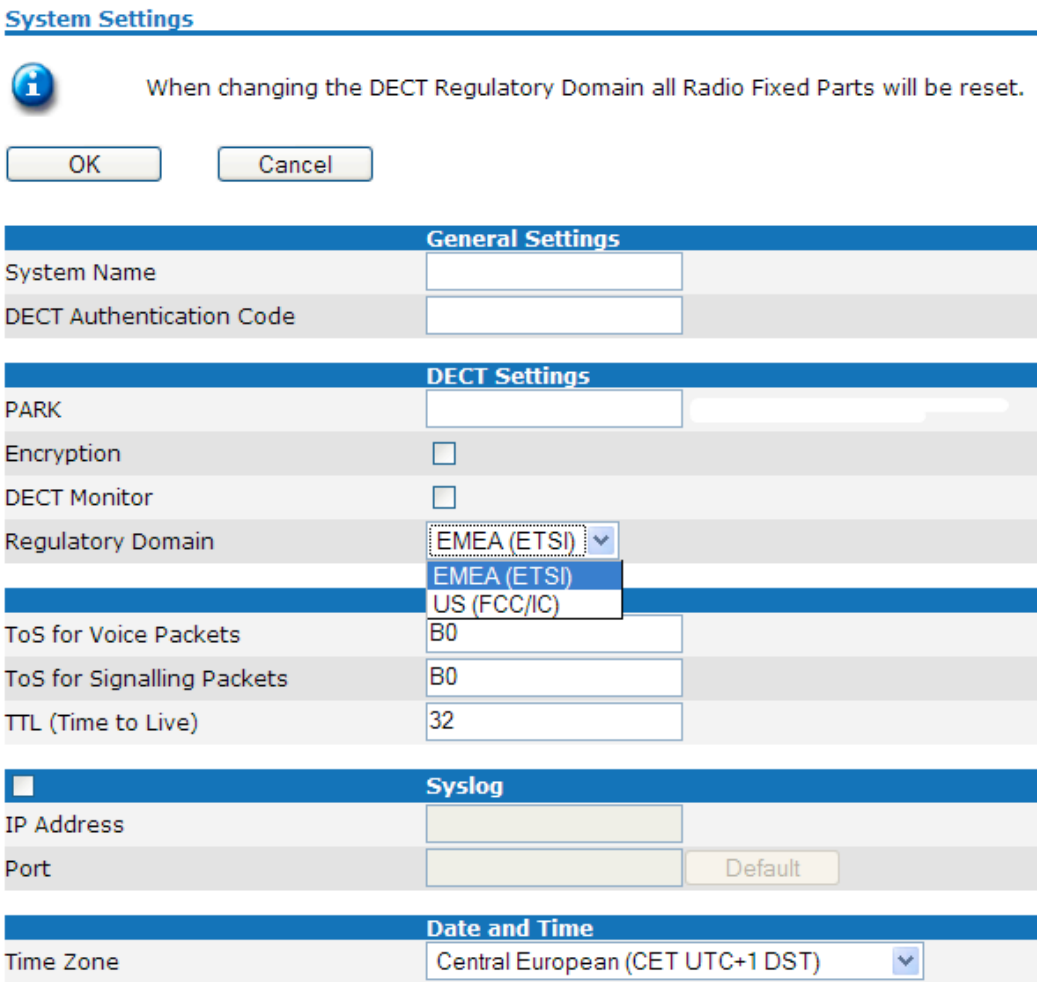
After the first ramp up of the OMM, the unit‘s green LED blinks
(during the ramp up the range LED flashes).
The OMM can now be configured via the WEB service http://ommipadress/

User Name: omm
Password: omm

OpenMobility Manager - Overview



OpenMobility Manager - System Settings



System Settings

DECT System required parameters are:

- Regulation domain (EMEA-ETSI, US-FCC/IC)

- PARK (on the system CD)

The system name is portrayed on the Aastra 142d.

The DECT-authentification code is used as master copy for the setup of new terminals.

OpenMobility Manager - SIP

SIP

Changing these settings may cause the OpenMobility Manager to be reset.

OK Cancel

Basic Settings		
Proxy Server	127.0.0.1	
Proxy Port	5060	
Registrar Server	127.0.0.1	
Registrar Port	5060	
Registration Period	3600	Seconds

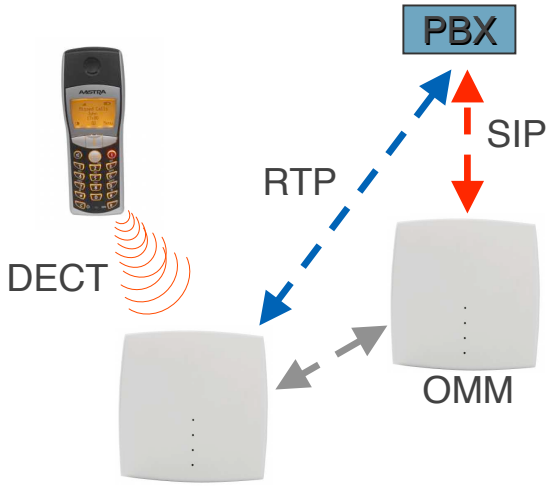
Advanced Settings		
Outbound Proxy Server		
Outbound Proxy Port	5060	
Explicit MWI Subscription	☐	
Registration Retry Timer	1200	Seconds
Transaction Timer	4000	Milliseconds

RTP Settings	
RTP Port Base	16320
Preferred Codec 1	G.711 u-law
Preferred Codec 2	G.711 A-law
Preferred Codec 3	G.729 A
Preferred Codec 4	G.723-63

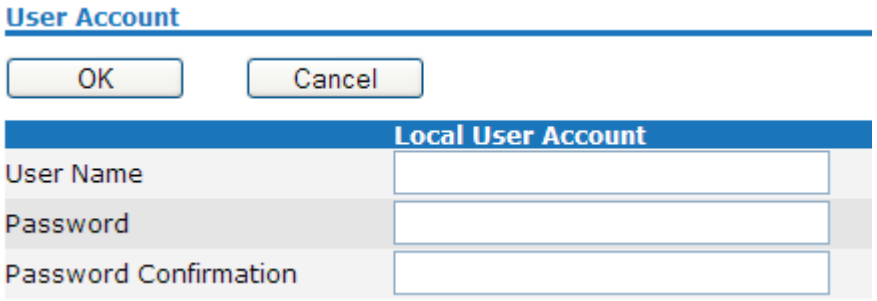
SIP

In this mask the SIP Server is inserted to which the OMM is connected.

The configuration of the SIP Clients is effected under terminals.



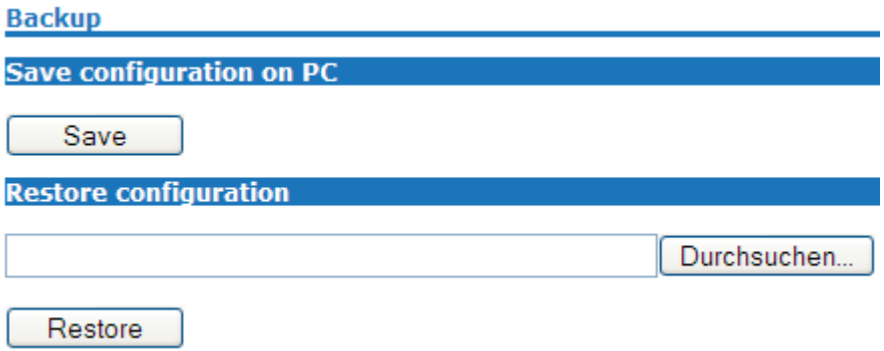
OpenMobility Manager – User Management



The user name and password can be changed via the user administration.

There is still only one user existent on the system.

OpenMobility Manager – Data Storage



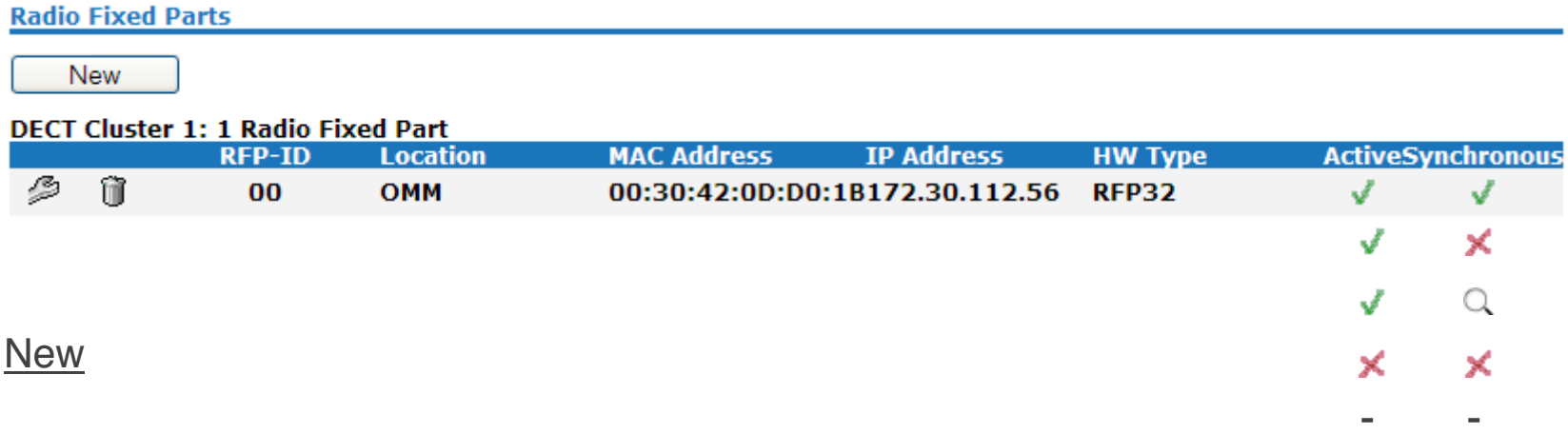
Backup:

The configuration of the OMM is saved via the file “config.omm.gz“.
This file contains all configured data on the OMM Webservice.

Data that has been configured via the OpenMobility Configurator
(e.g. IP-address, OMM IP address), are not saved.

The browser must allow the popup for saving the configuration.

OpenMobility Manager – Base Stations

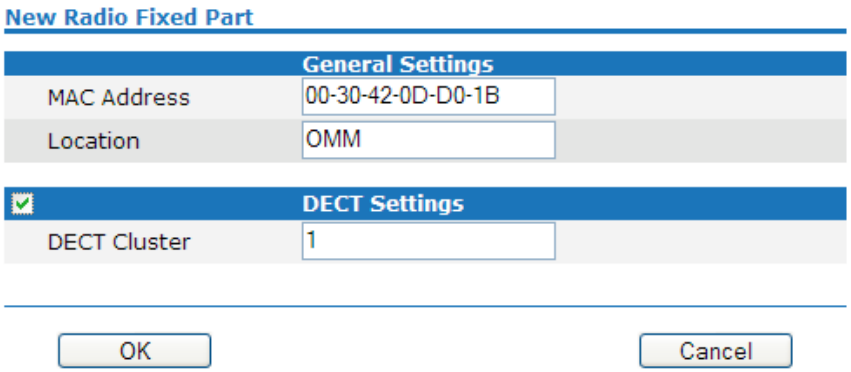


New

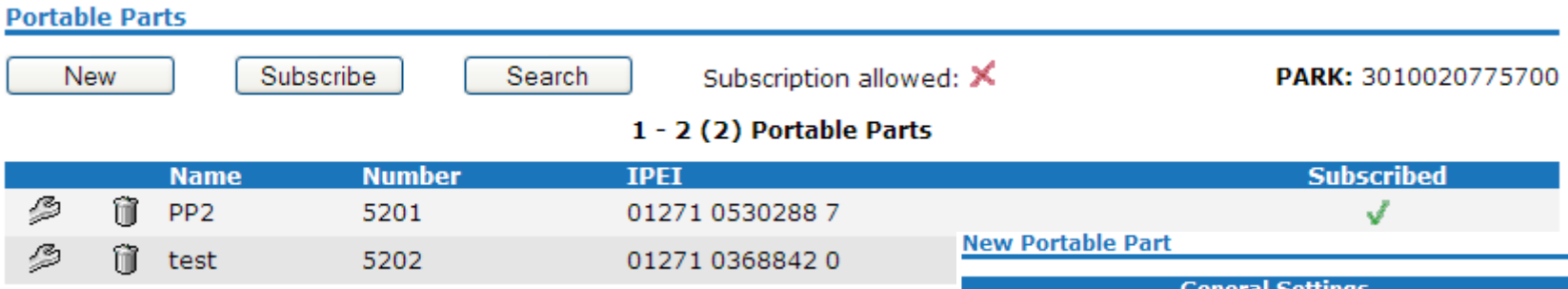
Add here new base stations.

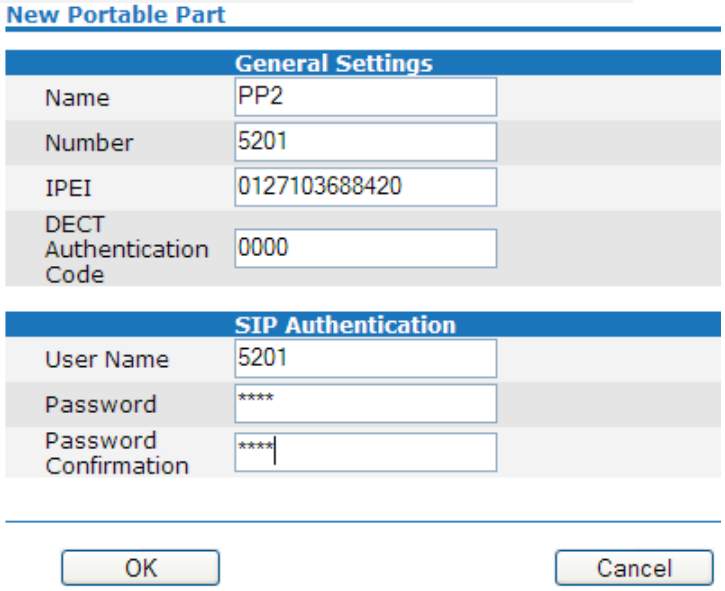
- MAC-address (see backside of the base station)
- Location (description for the base station)
- Cluster (for Sync over Air)

The OMM must be set up here as well.



OpenMobility Manager – Terminals





New Portable Part

Set up new DECT terminals here.

The registration ability of new handsets is initiated via the button “Subscribe“ .

142d Basic Features

- Call Forward (all calls / busy / no answer)
- Call Logs (dialled / missed / received)
- Handsets with personal phonebook
- Redial last number, redial list
- Call waiting & missed call indicator
- Caller ID with name & with Name on Call Waiting
- Call filter
- Hold call, hold call visual indication,
- Hold call reminder tones (calling party / called party)
- Mute
- Lock keypad
- Reset to factory default settings
- User interface in English, German, French and Spanish language
- Country specific tone plan

Special SIP Features

- SIP v2 and SDP (RFC 3261 / 2327 / 3264)
- Call transfer (blind and consulted; RFC 3515 / 3891 / 3892)
- Call forward (busy, no answer, timer triggered)
- Message Waiting Indication (RFC 3842)
- Broker call (support of two lines)
- Call waiting
- Caller ID with name (in all states, if supported by proxy)
- Do not disturb
- DTMF out-of-band (RFC 2833), in-band, INFO
- Call logs (dialled, missed, received)

IEEE & Codecs

- IEEE Specifications
  - IEEE 802.3af inline power
  - IEEE 802.1p QoS
  - IEEE 802.1Q VLAN tagging

- CODECS
  - G.711 u-law Codec
  - G.711 a-law Codec
  - G.723-6,3 and G.723-5,3
  - G.729A with silence suppression
  - Configuration of Codec preference and order
  - Configuration per Codec packet / frame rate

RFC Compliance

- RFC 1889 - RTP: A Transport Protocol for Real-Time Applications
- RFC 2030 - Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI
- RFC 2327 - SDP: Session Description Protocol
- RFC 2474 - Definition of the Differentiated Services Field (DS Field)
- RFC 2617 - HTTP Authentication: Basic and Digest Access Authentication
- RFC 2782 - A DNS RR for specifying the location of services (DNS SRV)
- RFC 2833 - RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals
- RFC 3261 - Session Initiation Protocol (SIP)
- RFC 3264 - An Offer/Answer Model with Session Description Protocol (SDP)
- RFC 3420 - Internet Media Type message / sipfrag
- RFC 3515 - The Session Initiation Protocol (SIP) Refer method [2]
- RFC 3665 - Session Initiation Protocol (SIP) Basic Call Flow Examples
- RFC 3842 - A Message Summary and Message Waiting Indication Event Package for the
- RFC 3891 - The Session Initiation Protocol (SIP) "Replaces" Header
- RFC 3892 - The Session Initiation Protocol (SIP) Referred-By Mechanism

PoE - Power over Ethernet

- RFP 3x IP support the Power over Ethernet Standard IEEE 802.3af
- RFP 33 IP and RFP 34 IP require PoE
- Power sourcing equipment (PSE) must support class 0

IEEE 802.3af power classification

Class	mode	Power in watt
0	Default	0.44 bis 12.95
1	Optional	0.44 bis 3.84
2	Optional	3.84 bis 6.49
3	Optional	6.49 bis 12.95

Typical power supply:

RFP 32 / 34: 6W
RFP 41 / 42: 9W

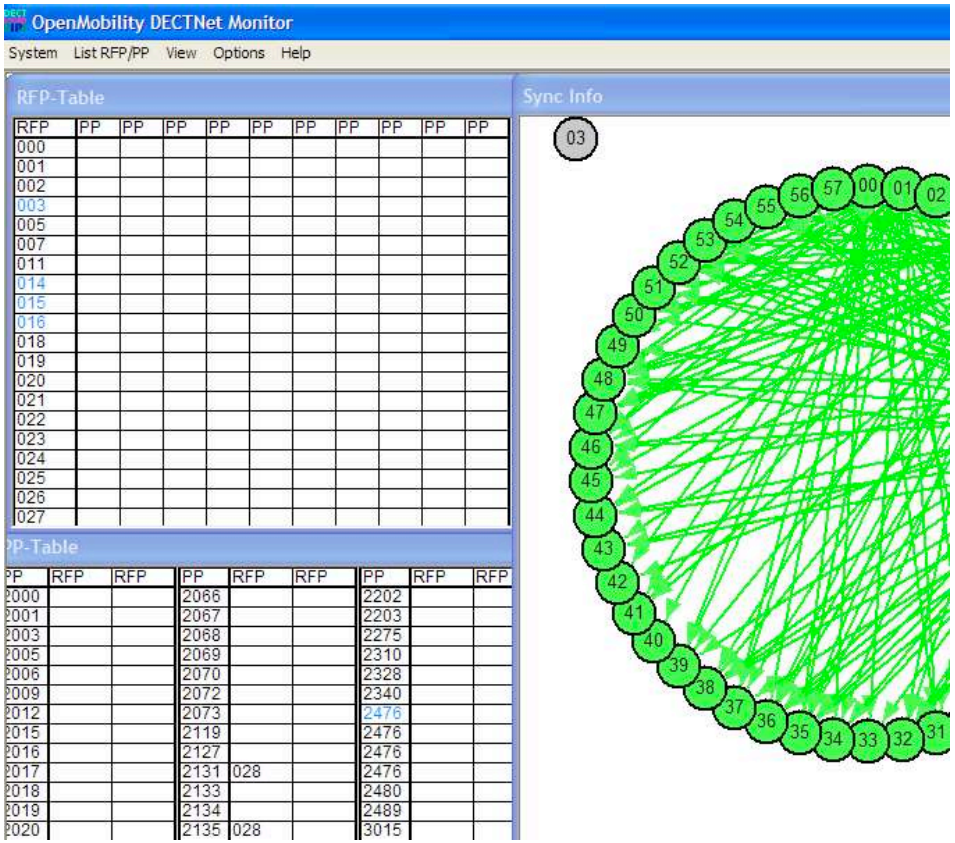
Quality of service (QoS)

Data packets from the base station for signalling and voice can be marked with ToS (Type of Service).

	IP Parameters
ToS for Voice Packets	B8
ToS for Signalling Packets	B8
TTL (Time to Live)	32

B8 heximal = 10111000 binary = 46 decimal = Expedited Forwarding (EF)

DECTNet Monitor

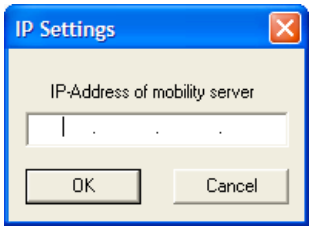


The DECTNet Monitor shows the current status of the base stations and telephones.

It shows the synchronization and synchronization relations between the base stations.

The DECT Monitor access can be released via the OMM (“System > System Settings“).

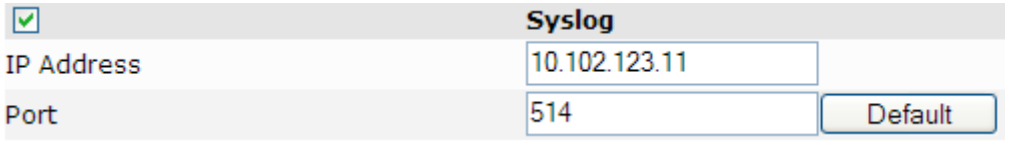
The DECT Monitor is directly connected with the OMM.



Syslog

Diagnosis- and status reports from the OMM and the base stations can be sent with the Syslog protocol to a Syslog server.

A Syslog server can be configured for all base stations in the OMM (under “System“).



In case that the Syslog server is set with the OpenMobility configurator, the reporting also shows ramp-up reports of the base stations.


```
daemon.info  192.168.243.60  init: ^MStarting pid 670, console /dev/ttyS0: '/sbin/shutdown'
syslog.info  192.168.243.60  System log daemon exiting.
  user.crit  192.168.243.61  rfp: 0221679472 ***** MAIN: connection closed by OMM (x=0)
 user.emerg  192.168.243.61  rfp: OMM link down
 user.emerg  192.168.243.61  WLAN: REBOOT (info = main, reason = 0x000004F7)
daemon.info  192.168.243.61  omcfg: recv. signal SIGUSR1
local0.info  192.168.243.61  udhcpc[517]: Performing a DHCP renew
local0.info  192.168.243.61  udhcpc[517]: using interface br0
local0.debug 192.168.243.61  udhcpc[517]: Sending renew (kernel)...
local0.info  192.168.243.61  udhcpc[517]: Lease of 192.168.243.61 obtained, lease time -1
user.notice  192.168.243.61  /etc/dhcpc/dhcpc.script: DHCPC bound
syslog.info  192.168.243.61  syslogd: received HUP signal
user.notice  192.168.243.61  syslog: tftpserver: 192.168.243.50 filename: /ram/ip_dect/ip_rfp.cnt
user.notice  192.168.243.61  syslog: checksum ok
```