

# DAPNET 2.0 Concept and Interface Definition

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## Abstract

This is the concept and interface description of the version 2 of the DAPNET. It's purpose in comparison to the first version released is a more robust clustering and network interaction solution to cope with the special requirements of IP connections over HAMNET which means that all network connections have to be considered with a WAN character resulting in unreliable network connectivity. In terms of consistence of the database, "eventually consistence" is considered to be the most reachable. There are "always right" database nodes inside the so called HAMCLOUD. In case of database conflicts, the version inside the HAMCLOUD cluster is always to be considered right.

## 1 Introduction

## 2 Concept presentation

An overview of the DAPNET 2.0 concept is given in Fig. 2.

write  
some his-  
tory

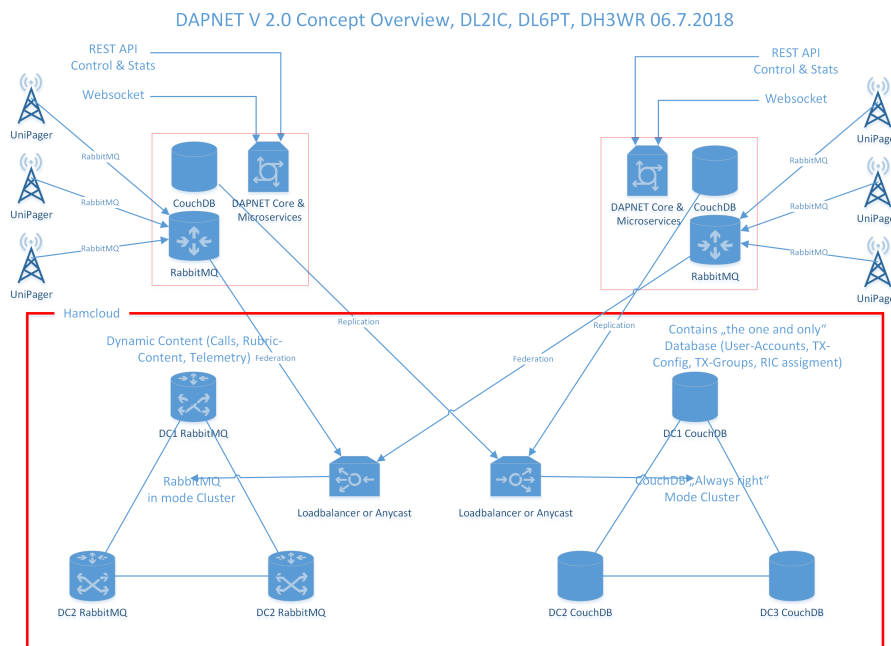


Figure 1: Overview of DAPNET Clutering and Network Structure

The details of a single node implementation are shown in Fig. ??.

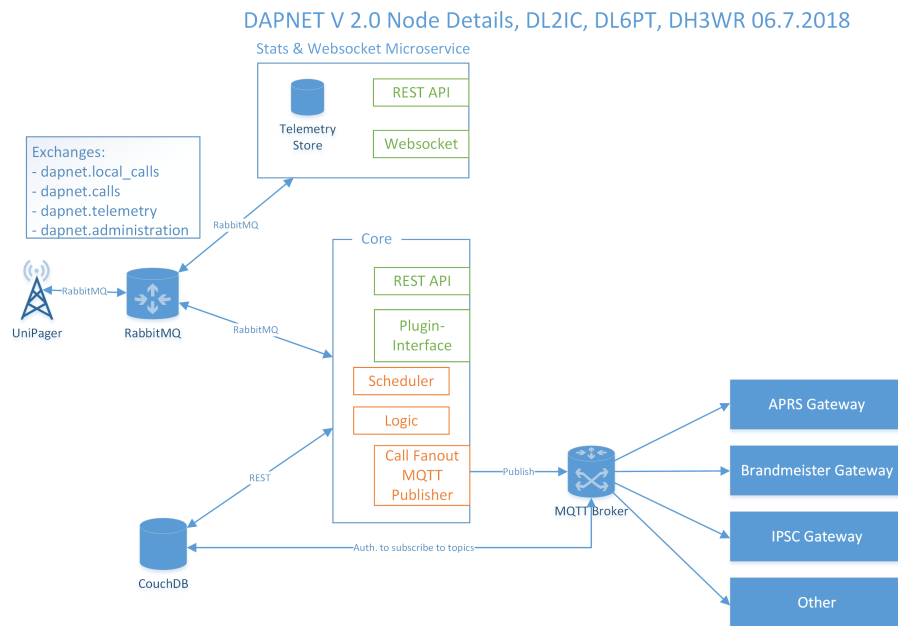


Figure 2: Node Details

## 2.1 HAMCLOUD presentation

The HAMCLOUD is a virtual server combination to server central services on the HAMNET and provide short hop connectivity to deployed service on HAMNET towards the Internet. There are three data centers at Essen, Nürnberg and Aachen, which have high bandwidth interlinks over the DFN. There are address spaces for uni- and anycast services. How this concept is deployed is still tbd. More information is here [https://www.swiss-artg.ch/fileadmin/Dokumente/HAMNET/HamCloud\\_-\\_Angebotene\\_Dienste\\_in\\_der\\_HamCloud.pdf](https://www.swiss-artg.ch/fileadmin/Dokumente/HAMNET/HamCloud_-_Angebotene_Dienste_in_der_HamCloud.pdf) and here <http://hamnetdb.net/?m=as&q=hamcloud>.

Define if uni- or anycast entry points will exist

## 3 Functionality definition of Nodes

### 3.1 CouchDB and RabbitMQ distributed infrastructure

### 3.2 Node Details

A node instance consists of several micro-services. The graphic representation is given in Fig. ???. This paragraph describes each part of a node.

#### 3.2.1 Stats and Websocket Micro-Service

**Websocket** The idea is to provide an API for the website and the app to display real-time information without the need of polling. A websocket server is listing to websocket connections. Authentication is done by a custom JOSN handshake. The connection might be encrypted with SSL if using the Internet or plain if using HAMNET. The definition of the protocol and valid data is given in section 6.2.

DL2IC: Was dazu schreiben, Auf Unterschied HAM-CLOUD oder nicht-HAMCLOUD Instanz eingehen

## 4 Interface definition

## 5 Visualization and management Website Connections

There will a responsive website will be the main user interface. Dynamic data to be displayed is transfered by two methods:

### 5.1 Polling based initial data dump

When the website is called, the DAPNET REST API is use to gather the required data according to content just displayed. The API is defined in section .

write  
API  
docu

## 6 ANNEX: Protocol Definitions

### 6.1 Transmitter connections

#### 6.1.1 Transmitter sign-in, configuration and keep-alive

If a transmitter wants to connect to DAPNET, the first step is to sign-in and show it's presence via a REST interface. This interface is also used for transmitter configuration like enabled timeslots and keep-alive polling.

Authentication of all HTTP-Requests in this context All HTTP-requests issued from a transmitter have to send a valid HTTP authentication, which is checked against the CouchDB. It consists of the transmitter name and its AuthKey.

Initial contact

POST /transmitter/bootstrap

```
{
  "callsign": "db0avr",
  "auth_key": "<secret>",
  "software": {
    "name": "UniPager",
    "version": "1.0.2"
  }
}
```

Answers to the bootstrap REST call

200 OK

```
{
  "timeslots": [true, true, false, true, ...],
  "nodes": [
    {
      "host": "node1.ampr.org",
      "port": 4000,
      "reachable": true,
      "last_seen": "2018-07-03T07:43:52.783611Z",
      "response_time": 42
    }
  ]
}
```

423 Locked

```
{
  "error": "Transmitter temporarily disabled by config."
}
```

423 Locked

```
{
  "error": "Transmitter software type not allowed due to serious bug."
}
```

Transmitter Heartbeat POST /transmitter/heartbeat

```
{
  "callsign": "db0avr",
  "auth_key": "<secret>",
  "ntp_synced": true
}
```

Answers to the heartbeat REST call 200 OK

```
{
  "status": "ok"
}
```

If network wants to assign new timeslots without disconnecting (for dynamic timeslots)

200 OK

```
{
  "status": "ok",
  "timeslots": [true, true, false, ...],
  "valid_from": "2018-07-03T08:00:52.786458Z"
}
```

If network wants to initiate handover to other node

503 Service unavailable

```
{
  "error": "Node not available, switch to other node."
}
```

## 6.2 Websocket API Definition

Once the actual status is known via the REST call, dynamic updates and telemetry data is send to the user's browser via websocket. Authentication is done by a authentication message by the browser right after connection. This procedure is the same as used in unipager.

### 6.2.1 Check authentication status

### 6.2.2 List of update messages

The updates can be send combined in one message of each message separately. In any case, the *transmittername* has to be sent to identify about what transmitter the data is.

Complete Telemetry, sent every xxx Seconds

Status Update

```
{
  "name": "db0acb",
  "transmitterupdate" : {
    "status" : {
      "OnAir" : true
    }
  }
}
```

Transmitter configuration Update

```
{
  "name": "db0acb",
  "transmitterupdate" : {
    "status" : {
      "ConfiguredIP": "123.4.3.2",
      "timeslots" : [true, false, ..., false],
      "SoftwareType" : "Unipager",
    }
  }
}
```

DL2IC:  
Könntest  
du das  
ergänzen?

```

        "SoftwareVersion" : "v1.2.3",
or
        "SoftwareType" : "MMDVM",
        "SoftwareVersion" : "20180504",
or
        "SoftwareType" : "DAPNET-Proxy",
        "SoftwareVersion" : "v2.3.4",

        "CPUHardwareType" : "Raspberry Pi 3B+"
        "RFHardware" : {
            "C9000" : {
                "UnipagerPowered" : true,
                "ArduinoPADummy" : true,
                "ArduinoPADummySettinginWatts" : 123,
                "ArduinoPADummyPort" : "/dev/ttyUSB0"
or
                "RPC-CardPowered" : false,
                "RPC-Version" : "XOS/2.23pre",
            },
            "Raspager" : {
                "RaspagerMod" : 13,
                "RaspagerPower" : 63,
                "ExternalPowerAmplifier" : false,
                "RaspagerRFVersion" : "V2"
            },
            "Audio" : {
                "TXModel" : ["GM1200", "T7F", "GM340", "FREITEXT"],
                "AudioLevelUnipager" : 83,
                "TxDelayinMilliseconds" : 3
            }
            "RFM69" : {
                "Port" : "/dev/ttyUSB0"
            },
            "MMDVM_DualHS..." : {
                "DAPNETExclusive" : true
            }
        }
    }
}

```

#### DAPNET-Proxy Update

```

{
    "name": "db0acb",
    "transmitterupdate" : {
        "status" : {
            "AX25" : {
                "ConnectionStatus" : "connected",
                "ConnectionStatus" : "connecting",
                "ConnectionStatus" : "disconnected"
            }
        }
    }
}

```

Telemetry Update Sent every minute complete, if there are changes, just a subset is sent.

```

{
    "name": "db0acb",
    "Telemetry" : {
        "ConnectionStatus": {
            "Connected" : true,
            "ConnectedtoNodeName" : "db0xyz"
            "ConnectedtoNodeIP" : "1.2.3.4"
            "ConnectedtoNodePort" : 1234
            "ConnectedSince" : "<timestamp-format>",
            "NTPSynced" : true,
            "NTPOffsetMilliseconds" : 124
            "NTPServerUsedIP" : ["134.130.4.1", "12.2.3.2"]
        }
    },
    "QueueStatus" : {
        "Telemetry" : {
            "QueuedMessages" : {

```

```

        "Total" : 1234,
        "Prio1": 1234,
        "Prio2": 1234,
        "Prio3": 1234,
        "Prio4": 1234,
        "Prio5": 1234,
        "Prio10": 1234
    },
    "PrefinedTemperatures" : {
        "Unit" : "C",
or
        "Unit" : "F",
or
        "Unit" : "K",

        "AirInlet" : 12.2,
        "AirOutlet" : 14.2,
        "Transmitter" : 42.2,
        "PowerAmplifier" : 45.2,
        "CPU" : 93.2,
        "PowerSupply" : 32.4
    },
    "CustomTemperatures" : {
        "Unit" : "C",
or
        "Unit" : "F",
or
        "Unit" : "K",
        [
            {"Value" : 12.2, "Description" : "Aircon Inlet"},
            {"Value" : 16.2, "Description" : "Aircon Outlet"},
            {"Value" : 12.3, "Description" : "Fridge Next to Programmer"}
        ],
    },
    "PowerSupply" : {
        "OnBattery": false,
        "OnEmergencyPower": false,
        "DCInputVoltage" : 12.4,
        "DCInputCurrent" : 3.23
    },
    "RFOutput" : {
        "OutputPowerForwardinWatts": 12.2,
        "OutputPowerReturninWatts" : 12.2,
        "OutputVSWR" : 1.2
    }
}
}

```

## 7 CouchDB Document Structure

### 7.1 Users

```

{
  "users": {
    "name": "dliabc",
    "password": "some hash",
    "email": "user@example.com",
    "admin": true,
    "enabled":true,
    "created_on":<DATETIME>,
    "last_change_by":"dh3wr",
    "email_valid":true
    "avatar_picture": <couchdb attachment??>
  }
}

```

### 7.2 Nodes

```

{
  "nodes" : {

```

```

        "name" : "db0abc",
        "status" : "OFFLINE",
    or
        "status" : "ONLINE",
    or
        "status" : "ERROR",
        "last_update" : DATETIME,
        "version" : "1.2.3",
        "ip_address" : "1.2.3.4",
        "latitude" : 34.123456,
        "longitude" : -23.123456,
        "hamcloudnode" : true,
        "owners" : ["dl1abc","dh3wr","dl2ic"],
        "avatar_picture": <couchdb attachment??>
}

```

### 7.3 Transmitters

```

{
    "transmitters" : {
        "name" : "db0abc",
        "auth_keys" : "hdjaskhdlj",
        "enabled" : true,

        "status" : "UNKNOWN",
    or
        "status" : "OFFLINE",
    or
        "status" : "ONLINE",

        "usage_type" : "PERSONAL",
    or
        "usage_type" : "WIDERANGE",

        "aprs_enabled" : true,
        "last_update" : "<DATETIME>",
        "last_connect" : "<DATETIME>",
        "connected_since" : "<DATETIME>",
        "ip_address" : "1.2.3.4",
        "device_type" : "Unipager",
        "device_version" : "1.3.2",
        "latitude" : 23.123456,
        "longitude" : -31.123456
        "rf_power_watt" : 12.3,
        "cable_loss_db" : 4.2,
        "antenna_gain_dbi" : 2.34,
        "antenna_agl" : 23.4,

        "antenna_type" : "OMNI",
    or
        "antenna_type" : "DIRECTIONAL",

        "antenna_direction" : 123.2,
        "owners" : ["dl1abc","dh3wr","dl2ic"],
        "member_in_transmittergroups" : ["dl-hh", "dl-all"],
        "frequency" : 439.9875,
        "emergency_power_available" : false,
        "infinite_emergency_power" : false,
        "emergency_power_duration_hours" : 23.0
        "antenna_pattern" : <couchDB attachment>,
        "avatar_picture" : <couchDB attachment>
    }
}

```

### 7.4 Transmitter Groups

Transmitter Groups are logical associations of one or more transmitters. This structure just defines the meta data of a transmitter group, the membership is part of the transmitter storage itself.

```

{
    "transmitter_groups" : {
        "name" : "dl-hh",

```

```

        "description" : "Deutschland-Hamburg",
        "owners" : ["dl1abc","dh3wr","dl2ic"],
    }
}

```

## 7.5 Subscribers

```

{
    "subscriber" : {
        "name" : "dl1abc",
        "description" : "Peter",
        "pagers" : [
            {
                "ric" : {123456, "A"}
            }
        ],
        "ric" : {123456, "D"},
        "uuid" : "0023-1233-aefe-1234-3423-9812",
        "name" : "Peters Alphapoc",
        "type" : "UNKNOWN",
        "type" : "Skyper",
        "type" : "AlphaPoc",
        "type" : "QUIX",
        "type" : "Swissphone",
        "type" : "SCALL_XT",
        "type" : "Birdy",
        "is_enabled" : true
    }, ...
],
    "owner" : ["dh3wr", "dl1abc"]
}

```

check if  
[] is valid  
JSON

## 7.6 Subscriber Groups

```

{
    "subscriber_group" : {
        "name" : "ov-G01",
        "description" : "Ortverband Aachen",
        "member_subscribers" : ["dl1abc", "dh3wr"],
        "owner" : ["dh3wr", "dl1abc"],
    }
}

```

## 7.7 Rubrics List

```

{
    "rubrics" : {
        "uuid" : "<UUID>",
        "number" : 14,
        "description" : "Wetter DL-HH",
        "label" : "WX DL-HH",
        "transmitter_groups" : ["dl-hh","dl-ns"]
        "cyclic_transmit_enabled" : true
        "cyclic_transmit_interval_minutes": 123,
        "owner" : ["dh3wr", "dl1abc"]
    }
}

```



## 7.8 Rubric's content

<UUID> of rubric (as defined in 7.7)

```
{
  "rubric_content" : {
    "uuid" : "<UUID>",
    ["content_message1", ..., "content_message10"],
  }
}
```