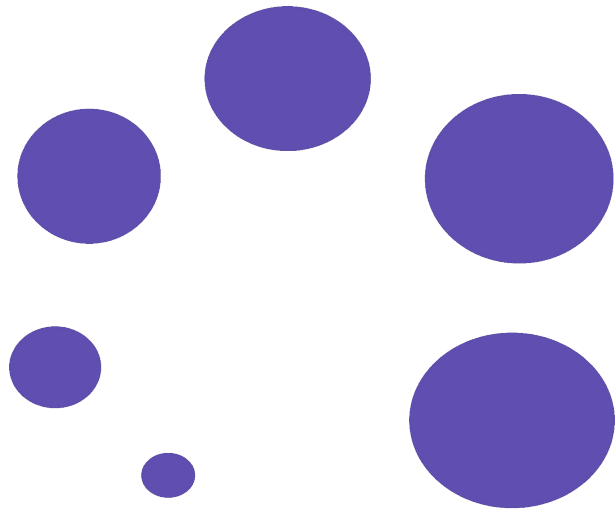


Spark

Multi-Standard Radio Modulator



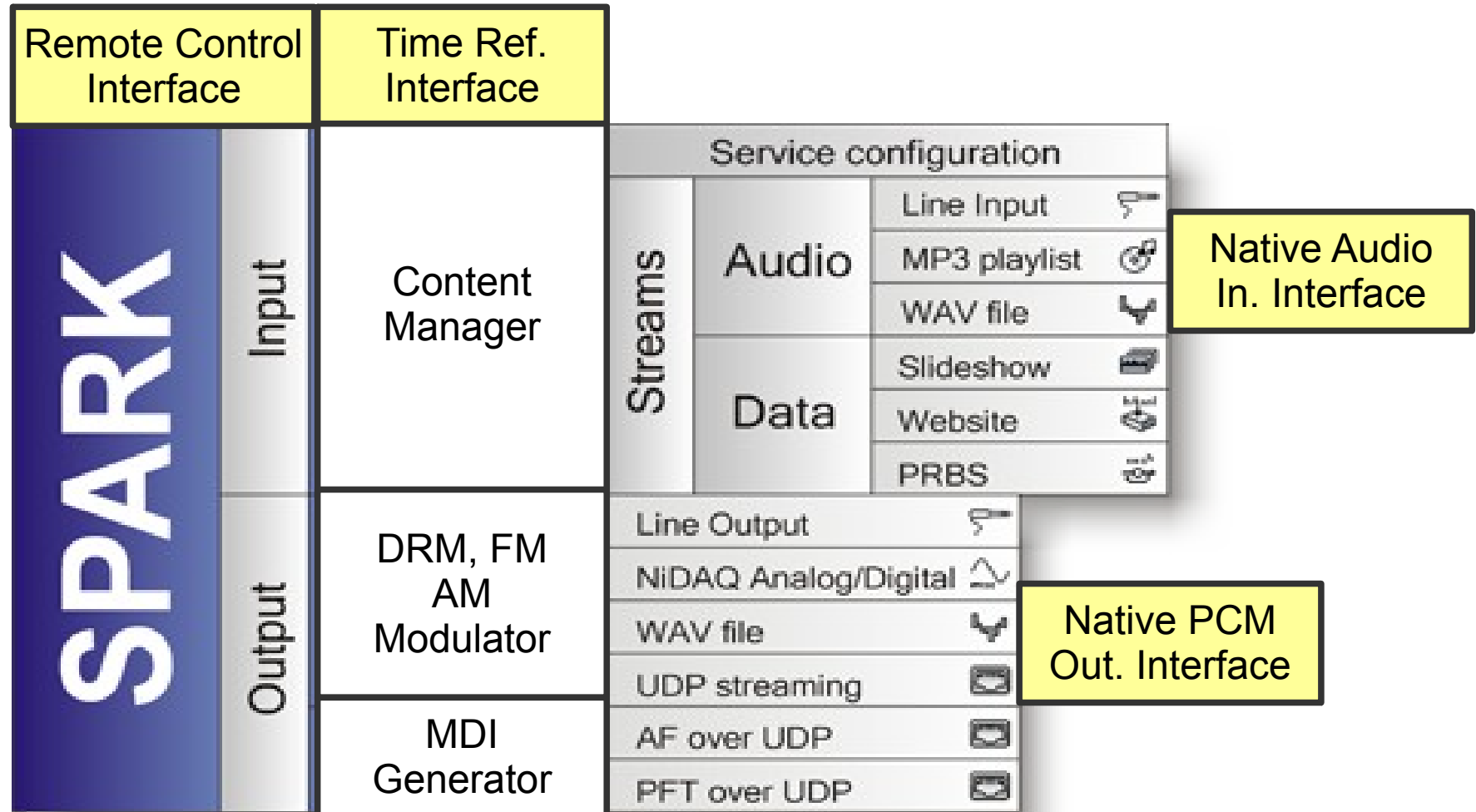
Michael Feilen
03.07.2014

What is Spark?

- Signal generator for DRM, FM-RDS, AM-AMSS
- Integrated content multiplexer
- Windows / Linux
- Java / C
- Remotely controllable



Architecture



DRM Multiplex Configuration

Spark Modulator

RCI server is listening on TCP port 8600

Transmitter | Content Manager | Time | Autopilot

Audio Stream | Data Stream

Spark
Service 0: 0x3E9
Language: German
Assigned: Audio 0

Spark
Service 1: 0x3EA
Language: German
Assigned: Audio 1

Dolby AAC+
Stream 0: Audio
Framesize: 573 bytes
Bitrate: 11.46 kBit/s

FAAC
Stream 1: Audio
Framesize: 400 bytes
Bitrate: 8.0 kBit/s

Pack MUX

Remote Control Settings

MSC bitrate: 17.47 kBit/s, multiplex in DRM30 mode.

Stream ID	Type	Name	Bitrate	High protected
0	Audio	Dolby AAC+	11.46 kBit/s	121 bytes
1	Audio	FAAC	8.0 kBit/s	86 bytes

Multiplexframe is 100 bytes too large. Pack MUX to fit.

Spark Modulator EDAPM v4.16 | (c) 2005 - 2014 Michael Feilen | SES (unlimited)

Dolby AAC+

Audio Input Device

Audio source : Line Input (Soundcard)

Line in device : Primary Sound Capture Driver

Line in buffersize : 1500 ms

Buffer controlling : OFF

AAC Encoder

Coder bitrate : 573 bytes = 11.46 kBit/s

HPP in percent : 20 % = 121 bytes

Encoder mode : Mono, 12 kHz, no SBR

Text Messages

No.	Message		
1	HI This is my message	4	

Ok Cancel







Bandwidth indicator

Stream configuration




DRM Multiplex Streams

- AAC+, CELP, HVXC liveaudio
- AAC+, CELP, HVXC precoded
- MOT slideshow
- MOT website
- Text messages
- PRBS

Audio Stream

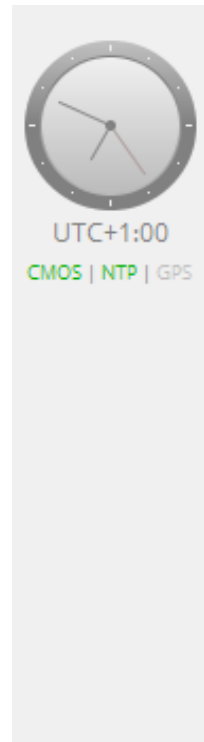
	AAC mono
	Precoded
	CELT
	AAC+
	CELP
	HVXC

Data Stream

	PRBS
	Slideshow
	Website

Time Ref. Input

- Synchronization monitoring
- NTP client
- GPS interface
- PC clock



General Time Settings

UTC time reference :

UTC local time offset :

UTC offset signalling :

GPS Receiver Settings

GPS device serial port :

GPS startup timeout : s

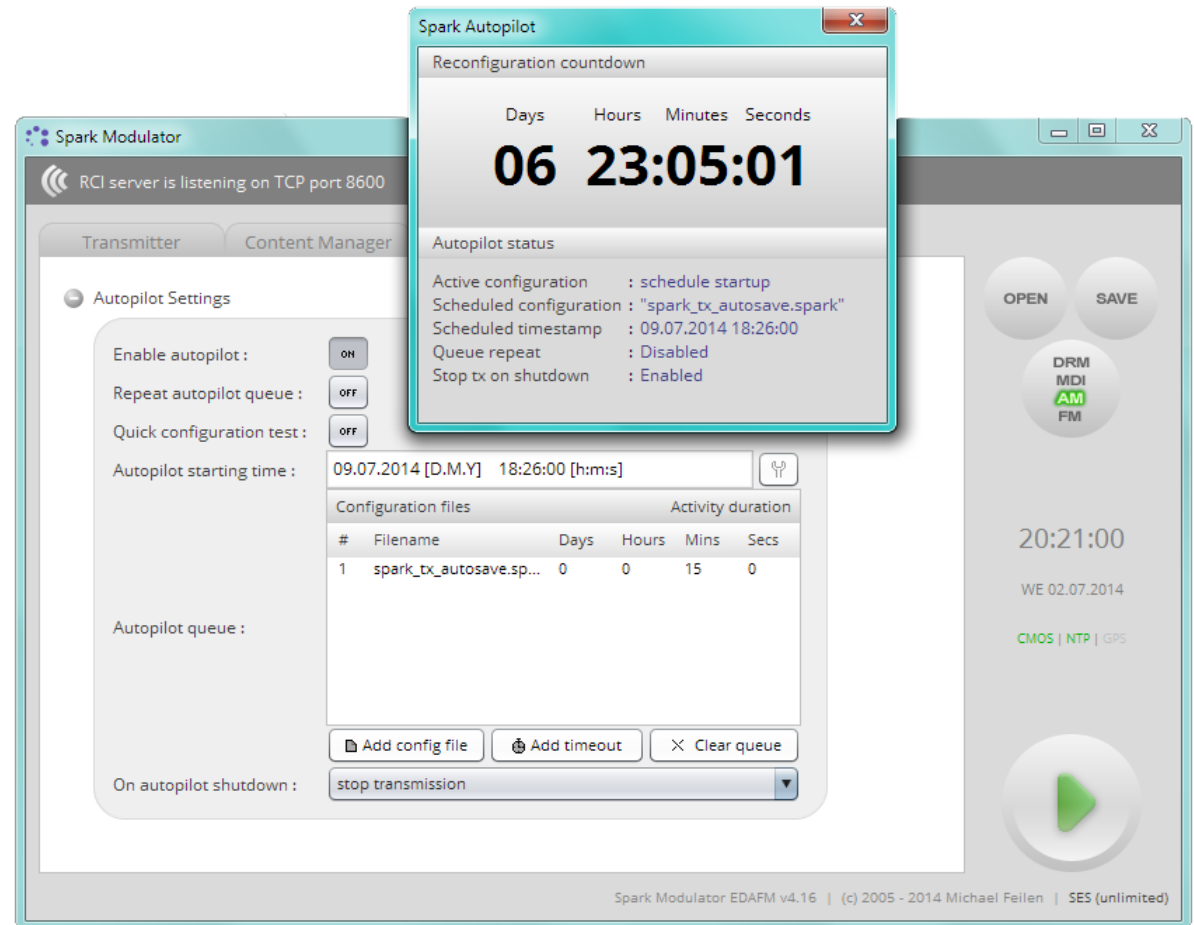
GPS clock sync. :

NTP Server Settings

Primary NTP server :

Autopilot :D

- Scheduled broadcasting
- Automated test file generation
- Batch testing



DRM options

- DRM30 or DRM+
- All modes/rates
- Automatic MUX rate adoption

The screenshot shows the Spark Modulator interface with the following settings:

- Robustness mode: Mode B (DRM30)
- OFDM bandwidth: 10 kHz
- MSC mapping: 64 QAM - Standard Mapping
- MSC cell interleaving: 2 s (long interleaving)
- MSC LPP protection: 0: highest
- MSC HPP protection: 0: highest
- MSC VSPP protection: 0: highest
- SDC mapping: 16 QAM - Standard Mapping
- SDC protection: 0: high
- Transmission layer: Base layer (recommended)

Below the settings, the OFDM Post-Processing section shows:

MSC bitrate: 17.47 kBit/s, multiplex in **DRM30** mode.

Stream ID	Type	Name	Bitrate	High protected
0	Data	PRBS data	17.46 kBit/s	0 bytes

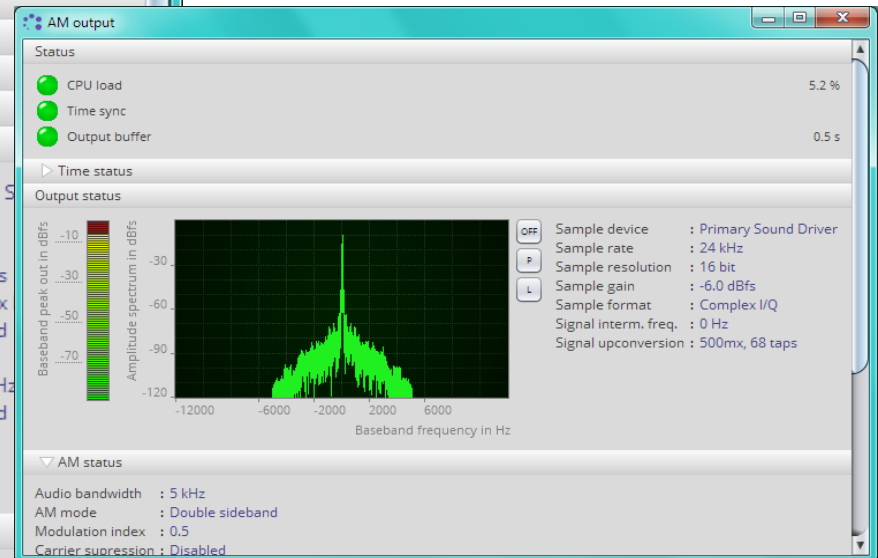
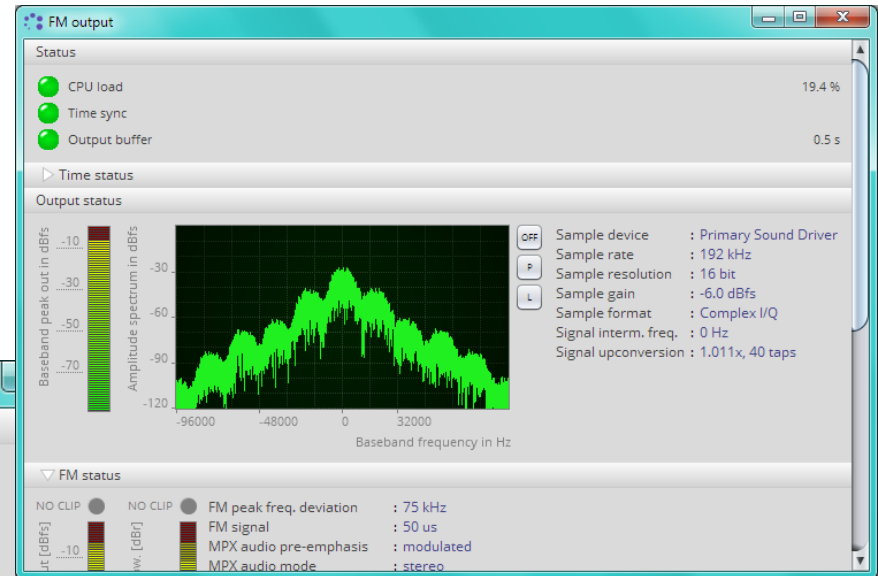
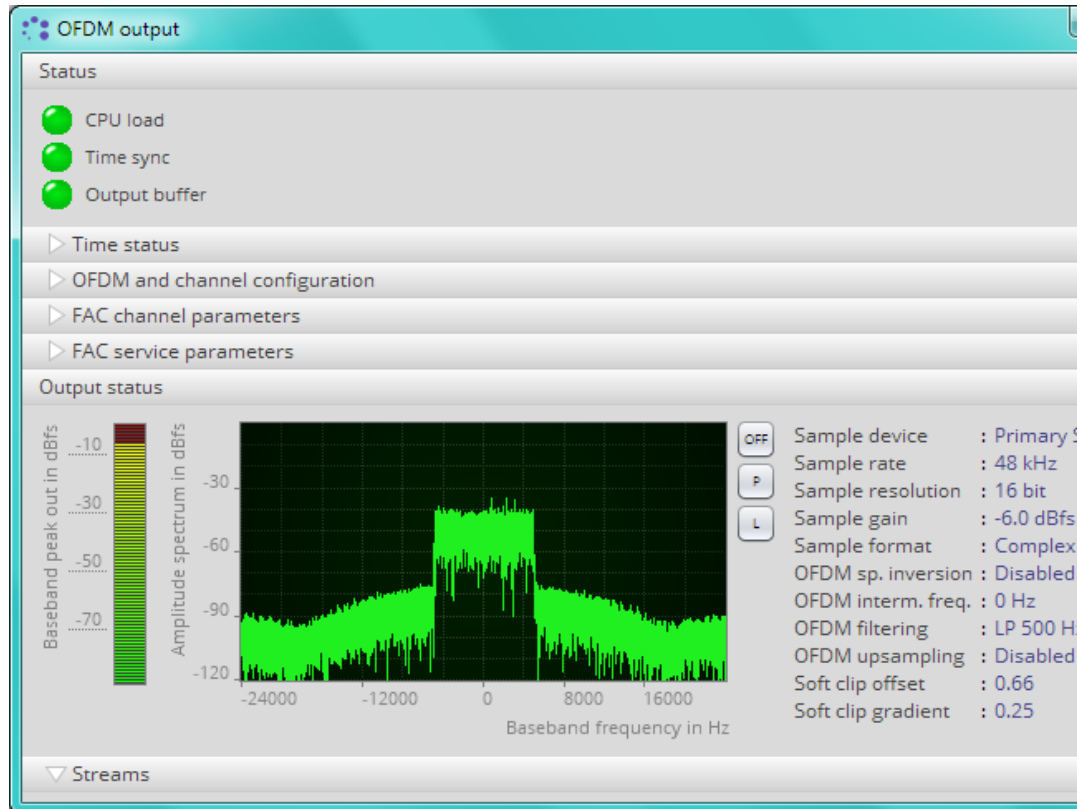
Multiplexframe occupies 873 of 873 available MSC bytes

PRBS

Spark Modulator EDAPM

Output monitoring


- Real-time spectrum



OFDM options



- Output AGC
- PAPR reduction
- Carrier AWGN
- FIR filtering
- IF modulation

OFDM Post-Processing

FIR filtering : ON 

Sideband suppression : dB

Transition bandwidth : Hz

FIR coefficient file :  

AGC window duration : ms

Carrier AWGN : OFF

Carrier AWGN CNR : dB

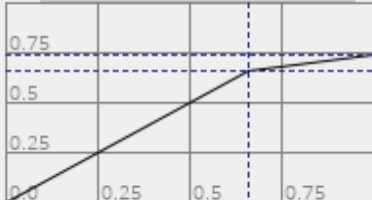
OFDM PAPR Reduction

PAPR reduction method :

Soft clip gradient : %

Soft clip offset : %

I/O transfer characteristic :



Modulation

Interm. frequency : Hz

Output frequency : kHz

Intermodulation : OFF

Output options

- IQ, real or env.-phase
- Baseband AWGN
- Ramp-up
- ETTUS and NI device support

Output Devices

Selected output device :

Output buffersize : ms

Output ramp up time : ms

Baseband AWGN :

Baseband AWGN SNR : dB

- + Line Out (Soundcard)
- + Wave File
- + NiDAQmx (not installed)
- + UDP/IP RAW Samples
- + Native Example Device
- + Ettus USRP Tx (not installed)

AM/AMSS and FM/RDS


AM Settings

Audio bandwidth : Hz

Modulation index :

AM mode :

Carrier suppression :

Enable AMSS : 

FM Settings

Advanced settings :


Peak freq. deviation (PFD) : Hz


RDS PFD proportion : dBfs


Pilot PFD proportion : dBfs

Output mode :

Pre-emphasis filter :

Enable pre-emphasis : 

Enable FM stereo : 

Enable RDS : 

Thank you!

BROADCASTING SOLUTIONS

FEILEN & STOLZ

Symposium zur DAB/DRM+-Sende-Infrastruktur KL