
Products: R&S® SFU

# Creating MediaFLO™ Test Scenarios in Accordance with the Minimum Performance Specification (MPS) V.1.2 Using the R&S® SFU

## Application Note

The FLO in MediaFLO stands for "forward link only". MediaFLO technology covers transmission of files and multimedia content to handheld devices.

The FLO device minimum performance specification (MPS) was created to ensure that FLO receivers can receive a FLO service that fulfils the compatibility guidelines of the FLO air interface specification. This Application Note shows how the Broadcast Test System R&S® SFU from Rohde & Schwarz can be used to generate all test scenarios required by the minimum performance specification.

ROHDE&SCHWARZ

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# Contents

# 1 Overview

The FLO in MediaFLO stands for "forward link only". MediaFLO technology covers transmission of files and multimedia content to handheld devices.

As with DVB-H, MediaFLO uses OFDM transmission with approximately 4000 (4K) carriers with either QPSK or 16QAM modulation of the carriers. MediaFLO also uses time division multiplexing, which is similar to what DVB-H refers to as time-slicing, to transmit specific content at specific time intervals. This allows the receiver to be shut down in between these intervals to save power. MediaFLO is mainly used in the USA.

The FLO device minimum performance specification (MPS) **[1]** was created to ensure that FLO receivers can receive a FLO service that fulfils the guidelines of the FLO air interface specification **[2]**.

The FLO device minimum performance specification contains definitions, test methods and minimum requirements for FLO receivers.

This Application Note shows how the Broadcast Test System R&S® SFU from Rohde & Schwarz can be used to generate all test scenarios stipulated in the minimum performance specification.

In addition, the Rohde & Schwarz MediaFLO device certification system will be briefly presented.

# 2 General Information About MediaFLO

Numerous brochures and white papers about MediaFLO can be found on the websites of Qualcomm and the FLO Forum. They give readers a better understanding of the technology and the market, and also include comparisons showing the extent to which MediaFLO differs from other mobile TV standards.

For further information, refer to **[3]** and **[4]**.

# 3 The Broadcast Test System R&S® SFU

The Broadcast Test System R&S® SFU was designed as a platform for different applications and for future options.

It provides a number of instruments and applications in a cabinet of only four height units and offers unrivaled RF and baseband characteristics.

Due to its modular design, the R&S® SFU can be optimally adapted to the requirements of different applications. It is an ideal research and development tool for making improvements to introduced standards and for generating new standard signals. Applications that previously required many different instruments are now fully covered by the R&S® SFU.

The system's main features:

- **Test transmitter for all digital and analog standards**
- **Bit error ratio meter**
- **Channel simulator**
- **Transport stream signal source**
- **I/Q signal generator**
- **Power measurement**
- **High output power**
- **I/Q interface**

# 4 Test Cases in Accordance with MPS Version 1.2 and R&S® SFU Requirements

The Broadcast Test System R&S® SFU allows you to generate a MediaFLO signal that can be used to operate MediaFLO terminals. The test system must have the following minimum configuration:

| **Rohde & Schwarz designation** | **Product designation** |
|---|---|
| R&S® SFU | Broadcast Test System (base unit) |
| R&S® SFU-K22 | TRP Player |
| R&S® SFU-B10 | Coder Extension 10 |
| R&S® SFU-K10 | MediaFLO Coder |

In this document, the test system configuration shown in the above table is referred to as the base configuration.

**Important:**

Please note that the required test streams for MediaFLO™ are provided through Qualcomm.

The minimum performance specification describes the five basic test setups listed below, which will be presented in detail in the following:

1. Data/OIS channel testing with fading (7.5.1-1)
2. Co-channel interference tests (7.5.1-2)
3. Tests without fading (7.5.1-3)
4. Tests for adjacent channel selectivity (7.5.1-4)
5. Tests for receiver sensitivity (7.5.1-5)

Besides a test schematic and the R&S SFU options that are required in addition to the base configuration in order to perform the tests, the references to the described test setup within the MPS will be indicated.

## 1st Test Setup: Data/OIS Channel Testing with Fading (7.5.1-1)

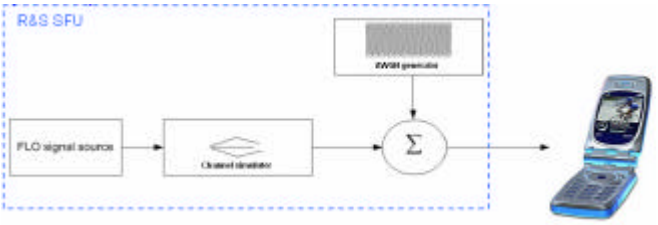



**Fig. 1: Test schematic for data/OIS channel testing with fading**

## Necessary R&S® SFU Configuration for Test Setup 1

| Rohde & Schwarz designation | Product designation |
|---|---|
| R&S SFU in the base configuration (see page 5) | |
| R&S® SFU-K40 | AWGN Noise |
| R&S® SFU-B30 | Fading Simulator (20 paths) |
| R&S® SFU-K30 | Enhanced Fading |

## References to Test Setup 1 within the MPS

- Section 3.1.2.1.2 “Wide-Area Data Channel Demodulation in Multipath Fading Channel”
- Section 3.1.2.2.2 “Wide-Area OIS Channel Demodulation in Multipath Fading Channel”
- Section 4.1.1.1 “Performance of Wide-Area Data Channel with Reed-Solomon Coding in Multipath Fading Channel”

## 2nd Test Setup: Co-channel Interference Tests (7.5.1-2)

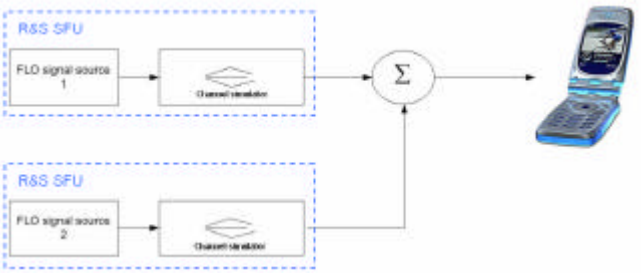



**Fig. 2: Test schematic for co-channel interference tests**

## Necessary R&S® SFU Configuration for Test Setup 2

**Important:**

Please note that two R&S SFU are used for the described test setup.

*FLO signal source 1: R&S SFU no. 1*

| Rohde & Schwarz designation | Product designation |
|---|---|
| R&S SFU in the base configuration (see page 5) | |
| R&S® SFU-B30 | Fading Simulator (20 paths) |
| R&S® SFU-K30 | Enhanced Fading |

*FLO signal source 2: R&S SFU no. 2*

| Rohde & Schwarz designation | Product designation |
|---|---|
| R&S SFU in the base configuration (see page 5) | |
| R&S® SFU-B30 | Fading Simulator (20 paths) |
| R&S® SFU-K30 | Enhanced Fading |

## References to Test Setup 2 within the MPS

- Section 3.1.2.1.3 “Wide-Area Data Channel Demodulation under Fading and Co-channel Interference”
- Section 3.1.2.1.4 “Wide-Area Data Channel Demodulation under Local-Area Changes”
- Section 3.1.2.1.5 “Wide-Area Data Channel Demodulation following Wide-Area Change”
- Section 3.1.2.1.6 “Local-Area Data Channel Demodulation following Local-Area Changes”
- Section 3.1.2.2.3 “Local-Area OIS Channel Demodulation Under Fading and Co-Channel Interference”

- Section 3.1.2.3.1 “WIC and LIC Demodulation in Multipath Fading and Co-Channel Interference”

## 3rd Test Setup: Tests without Fading (7.5.1-3)

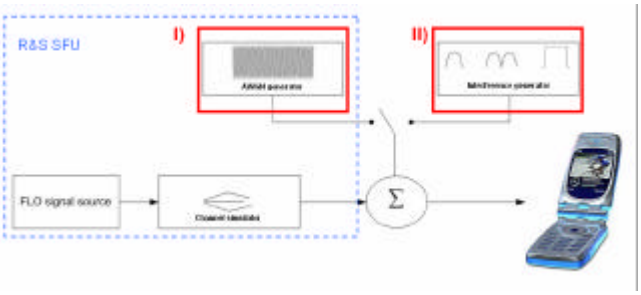



**Fig. 3: Test schematic for tests without fading**

## Necessary R&S® SFU Configuration for Test Setup 3

**For I) the following R&S SFU configuration must be used:**

| Rohde & Schwarz designation | Product designation |
|---|---|
| R&S SFU in the base configuration (see page 5) | |
| R&S® SFU-K40 | AWGN Noise |
| R&S® SFU-B30 | Fading Simulator (20 paths) |
| R&S® SFU-K30 | Enhanced Fading |

**For II) the following R&S SFU configuration must be used:**

**Important:**

Please note that the described test setup includes one to two CW generators in addition to the R&S SFU.

*FLO signal source 1: R&S SFU*

| Rohde & Schwarz designation | Product designation |
|---|---|
| R&S SFU in the base configuration (see page 5) | |
| R&S® SFU-B30 | Fading Simulator (20 paths) |
| R&S® SFU-K30 | Enhanced Fading |

*CW generators:*

The CW generators used must meet the specifications under 7.4.4 “CW Generator” of the MPS. CW signals must be capable of being generated at frequencies of up to 6 GHz depending on the test case. For more details, refer to the following MPS references.

- The two CW singals in section 3.1.3.2 can be generated using the ARB generator of an additional R&S SFU with the following possible configuration:

| **Rohde & Schwarz designation** | **Product designation** |
|---|---|
| R&S® SFU-K81 | Realtime coder disable |
| R&S® SFU-B3 | Memory extension 1 |
| R&S® SFU-K35 | ARB generator |

- The CW signal described in section 3.1.3.4 can be generated using the R&S SMA100.

## References to Test Setup 3 within the MPS

- Section 3.1.2.1.1 “Wide-Area Data Channel Demodulation in AWGN“
- Section 3.1.2.2.1 “Wide-Area OIS Channel Demodulation in AWGN”
- Section 3.1.3.2 “Intermodulation Spurious Response Attenuation”

  (2 x CW ; up to 1 GHz)
- Section 3.1.3.4 “Receiver Blocking Characteristics”

  (1 x CW; up to 6 GHz)

## 4th Test Setup: Tests for Adjacent Channel Selectivity (7.5.1-4)

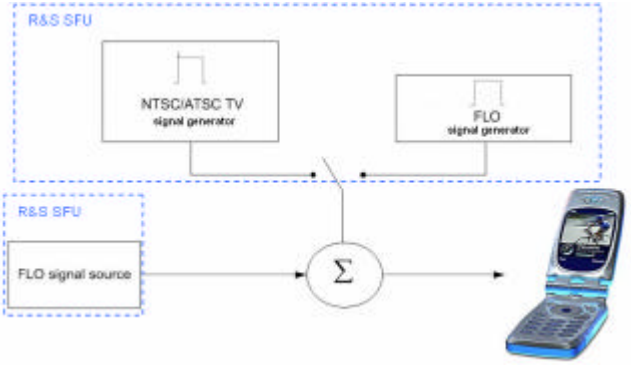



**Fig. 4: Test schematic for adjacent channel selectivity**

### Necessary R&S® SFU Configuration for Test Setup 4

**Important:**

Please note that two R&S SFUs are used for the described test setup.

*FLO signal source: R&S SFU no. 1*

| Rohde & Schwarz designation | Product designation |
|---|---|
| R&S SFU in the base configuration (see page 5) | |

*Interferer source: R&S SFU no. 2*

| Rohde & Schwarz designation | Product designation |
|---|---|
| R&S SFU in the base configuration (see page 5) | |
| R&S® SFU-B3 | Memory Extension 1 |
| R&S® SFU-K199 | Multi ATV Predefined |

### References to Test Setup 4 within the MPS

- Section 3.1.3.3 “Adjacent Channel Selectivity”

## 5th Test Setup: Tests for Receiver Sensitivity (7.5.1-5)


**Fig. 5: Test schematic for receiver sensitivity**

### Necessary R&S® SFU Configuration for Test Setup 5

*R&S SFU no. 1: FLO signal source 1*

| **Product designation** |
| --- |
| R&S SFU in the base configuration (see page 5) |

### References to Test Setup 5 within the MPS

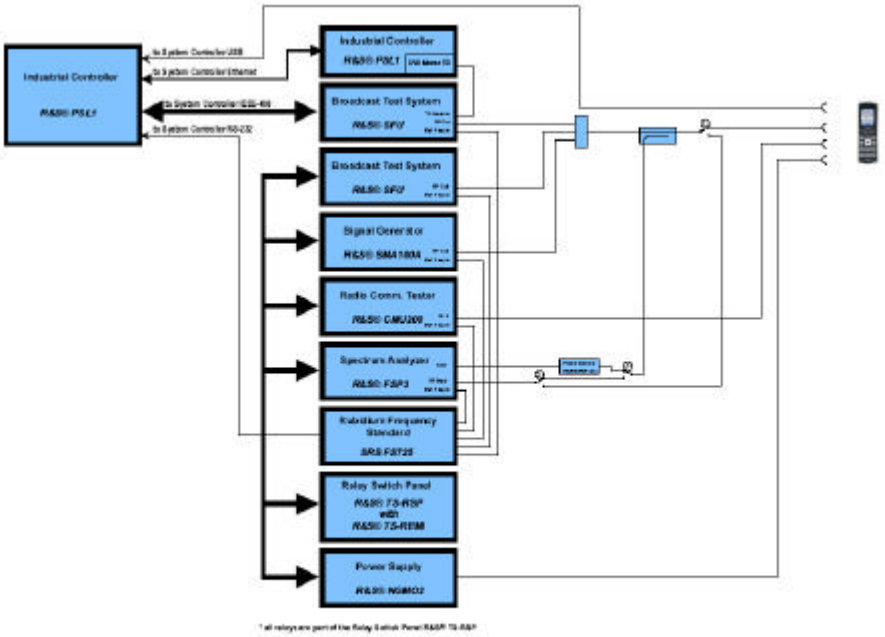
- Section 3.1.3.1 “Receiver Sensitivity and Dynamic Range”

# 5 The Rohde & Schwarz MediaFLO Device Certification System (FDCS)

The MediaFLO device certification system from Rohde & Schwarz provides manufacturers of MediaFLO terminals with a comprehensive solution for research and development.

The automated FDCS test system ensures that the test scenarios for terminals provided by the FLO Forum are performed correctly in accordance with the minimum performance specification.

The R&S TU8980 is a FLO device certification system of this kind:




TU8980 FDCS - MediaFLO™ Device Certification System

For further information about the Device Certification Systems please contact Info@rsa.rohde-schwarz.com.

# 6 References

[1] FLO Forum (Ed.) (June 19, 2006). FLO Device Minimum Performance Specification Rev. 1.2. Fremont, USA: FLO Forum.

[2] FLO Forum (Ed.) (December 22, 2005). FLO Air Interface Specification Rev 1.1. Fremont, USA: FLO Forum.

[3] http://www.qualcomm.com/mediaflo/news/resources.shtml

[4] http://www.floforum.org/

# 7 Additional Information

Our Application Notes are regularly revised and updated. Check for any changes at http://www.rohde-schwarz.com.

Please send any comments or suggestions about this Application Note to Broadcasting-TM-Applications@rohde-schwarz.com.

# 8 Ordering Information

| | | |
|---|---|---|
| BROADCAST TEST SYSTEM | R&S® SFU | 2110.2500.02 |
| DOCUMENTATION | R&S® SFU-DCV | 2082.0490.30 |
| EXTENSION BOARD 1 | R&S® SFU-B1 | 2110.7424.02 |
| MEMORY-ERWEITERUNG 1 | R&S® SFU-B3 | 2110.7447.02 |
| MEMORY-ERWEITERUNG 2 | R&S® SFU-B4 | 2110.7453.02 |
| USER I/O | R&S® SFU-B5 | 2110.7460.02 |
| 2nd HARDDISK | R&S® SFU-B6 | 2110.7501.02 |
| EXTENSION BOARD 10 | R&S® SFU-B10 | 2110.7747.02 |
| ETI INPUT | R&S® SFU-B11 | 2110.7553.02 |
| FADING SIMULATOR, 20 PATHS | R&S® SFU-B30 | 2110.7530.02 |
| FADING SIMULATOR EXTENSTION | R&S® SFU-B31 | 2110.7547.02 |
| HIGHER OUTPUT POWER | R&S® SFU-B90 | 2110.8008.02 |
| CODER DVB-T/H, 2K/4K/8K-COFDM | R&S® SFU-K1 | 2110.7301.02 |
| CODER DVB-C | R&S® SFU-K2 | 2110.7324.02 |
| CODER DVB-S/DVB-DSNG, | R&S® SFU-K3 | 2110.7330.02 |
| CODER ATSC/8VSB | R&S® SFU-K4 | 2110.7353.02 |
| CODER J.83B | R&S® SFU-K5 | 2110.7360.02 |
| CODER TDS-OFDM (DMB-T CHINA) | R&S® SFU-K7 | 2110.7382.02 |
| CODER DVB-S2 BRODCAST SERVICE | R&S® SFU-K8 | 2110.7399.02 |
| CODER DIRECTV | R&S® SFU-K9 | 2110.7401.02 |
| CODER MEDIAFLO | R&S® SFU-K10 | 2110.7524.02 |
| CODER T-DMB/DAB | R&S® SFU-K11 | 2110.7518.02 |
| TS-GENERATOR, SDTV TEST- | R&S® SFU-K20 | 2110.7476.02 |
| TRP-RECORDER AND PLAYER | R&S® SFU-K21 | 2110.7482.02 |
| TRP-PLAYER | R&S® SFU-K22 | 2110.7499.02 |
| DYNAMICAL FADING UND ERHOEHTE | R&S® SFU-K30 | 2110.7560.02 |
| ARB GENERATOR | R&S® SFU-K35 | 2110.7601.02 |
| INTERFERER MANAGEMENT | R&S® SFU-K37 | 2110.7647.02 |
| NOISE GENERATOR AWGN, DIGITAL | R&S® SFU-K40 | 2110.7653.02 |
| PHASE NOISE | R&S® SFU-K41 | 2110.7660.02 |
| IMPULSIVE NOISE | R&S® SFU-K42 | 2110.7676.02 |
| MULTINOISE | R&S® SFU-K43 | 2110.7682.02 |
| SW FOR POWER MEASUREMENT | R&S® SFU-K55 | 2110.7753.02 |
| BER-MEASUREMENT | R&S® SFU-K60 | 2110.7782.02 |
| EXTENDED ANALOG-I/Q IN | R&S® SFU-K80 | 2110.7953.02 |
| REALTIME DISABLED | R&S® SFU-K81 | 2110.7960.02 |
| REALTIME ENABLED | R&S® SFU-K82 | 2110.7976.02 |
| CODER AMC | R&S® SFU-K108 | 2110.7418.02 |
| MULTI ATV PREDEFINED | R&S® SFU-K199 | 2110.8089.02 |
| T-DMB STREAMS | R&S® SFU-K221 | 2110.4348.02 |
| T-DMB WAVEFORM | R&S® SFU-K351 | 2110.4277.02 |
| DVB-H | R&S® SFU-K352 | 2110.4425.02 |
| DRM | R&S® SFU-K353 | 2110.4690.02 |
| DTV INTERFERER | R&S® SFU-K354 | 2082.0490.30 |

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