

# GMS

## GeoSIG Measuring System



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# Introduction

## GeoSIG Measuring System, GMS



# Major Features

## GeoSIG Measuring System, GMS

- Internet Enabled, Wireless Ready, Multifunctional 24 Bit Measuring System
- Latest Technology with Linux based Operating System
- On Board Processing and Evaluation Capabilities
- Timing via NTP (Network Time Protocol), GPS or 433 MHz Wi-Synch
- Enhanced Connectivity Options for GSM, GPRS, Satellite, Radio Telemetry or Landline Modem, Wired/Wireless Network
- Ring Buffer Continuous Recording
- Data Stream Output, Network Triggering
- Rugged, Water Resistant Cast Aluminum Housing
- Levelling Base Plate for easy installation and Replacement





# GMS Evolution: GeoSIG Dense Networks Experience

- IA-1: Pacific Div. of the Geological Survey of Canada (GSC)  
GBV-316: University of Bergen, Institute of Solid Earth Physics  
CR-4: Servizio Sismico Nazionale (SSN), Italy  
GSS-xx: Kandilli Observatory and Earthquake Research Institute (KOERI), Turkey

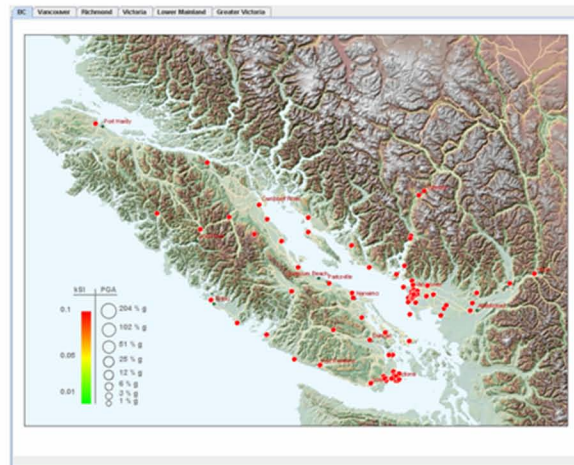


Figure 1. Locations of more than 100 IA-1 Stations at British Columbia, Canada

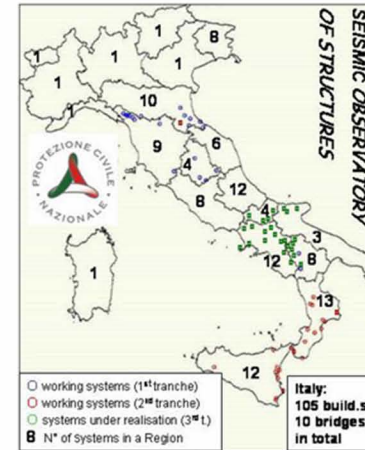


Figure 2. Seismic Observatory of Structures with more than 1000 Acceleration Axes, Servizio Sismico Nazionale (SSN), Italy



Figure 3. Locations of 100 Earthquake Rapid Response Stations, Turkey

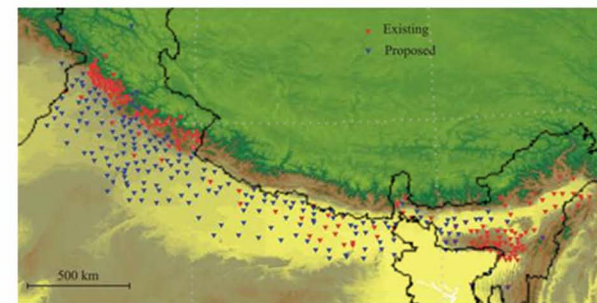


Figure 4. Proposed Locations of 300 Digital Strong Motion Instruments, National Strong Motion Instrumentation Network, India

# GMS Evolution: GeoSIG Hardware Experience

**GeoSIG  
IA-1**

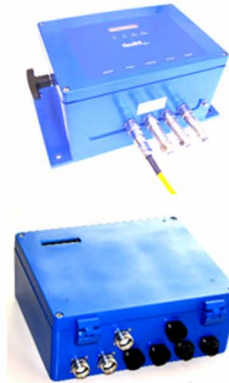


Internet Accelerograph

Linux based, Internet enabled, Time sync from internet, extended field experience of array.

+

**GeoSIG  
GSR-16 / 18 / 24,  
GSR-05**



Seismic / Strong Motion Recorder

Long term operation, experiences, Linux based with custom made platform.

+

**GeoSIG  
AC-43 / 63 / 73**



Mechanical or MEMS accelerometer

High performance accelerometer, optimum noise, low cost, specific housing

+

**WiFi ENABLED**

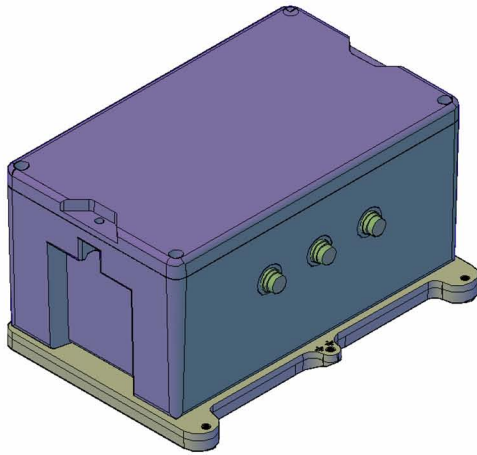
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**GMS**

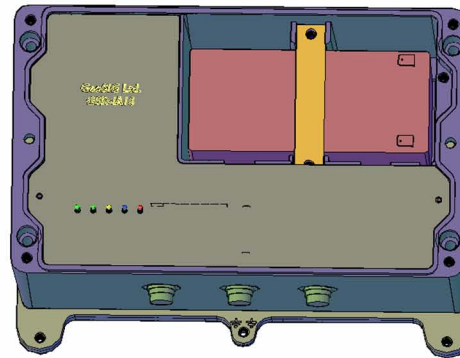


GeoSIG Measuring System GMS

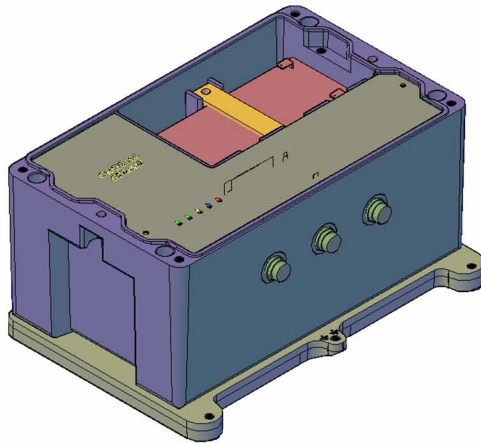
# Mechanical Design



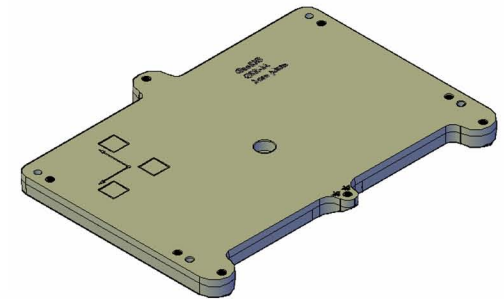
Innovative Cover



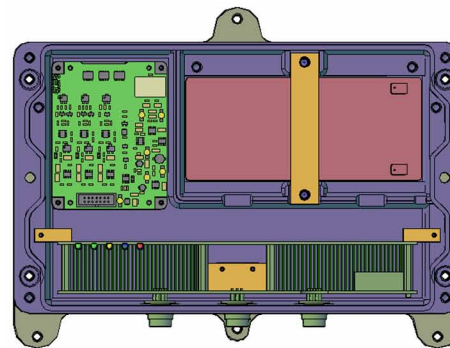
Innovative Battery Compartment



Innovative Housing Shape

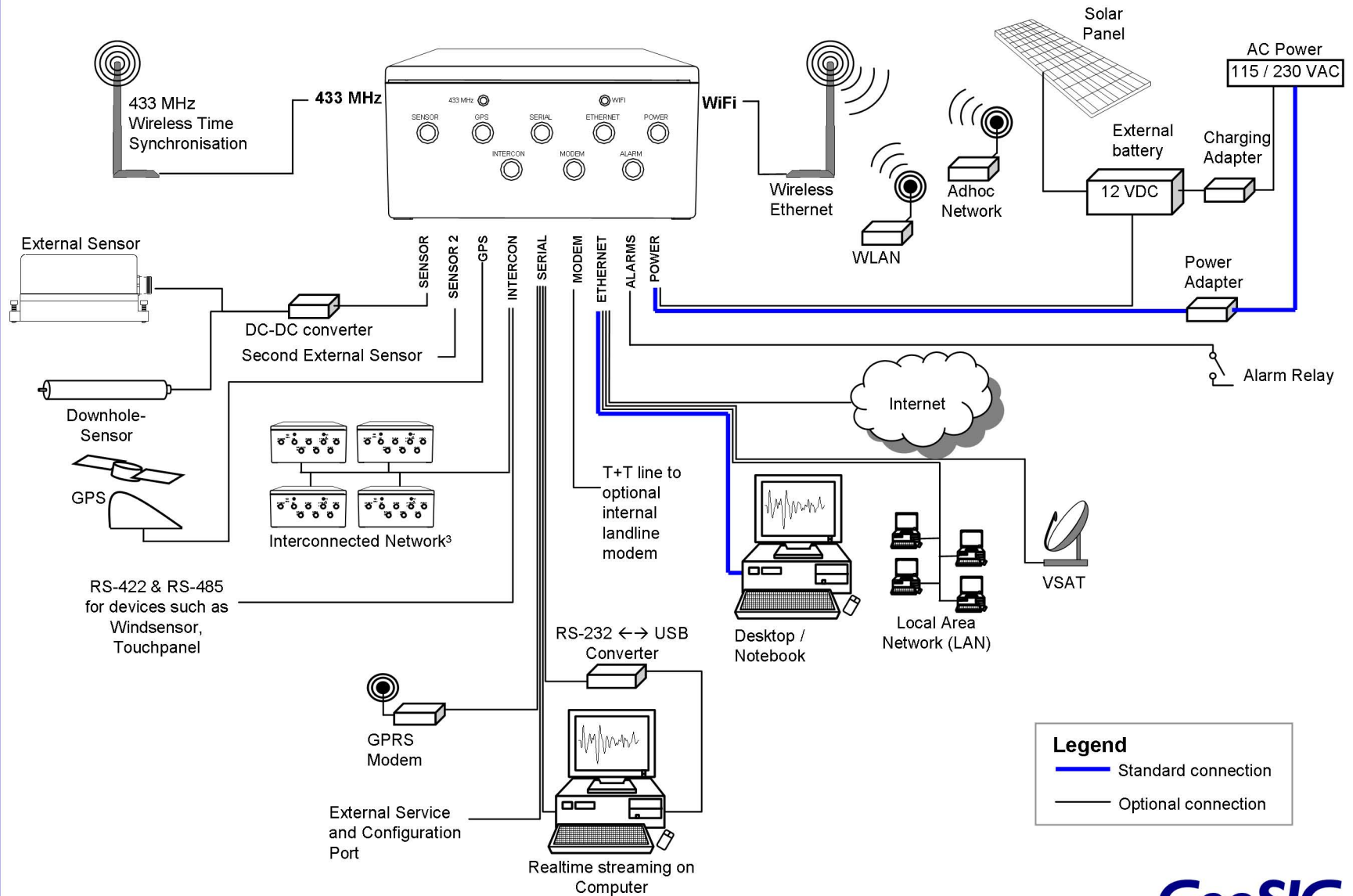


Innovative Baseplate



Innovative Internal Sections

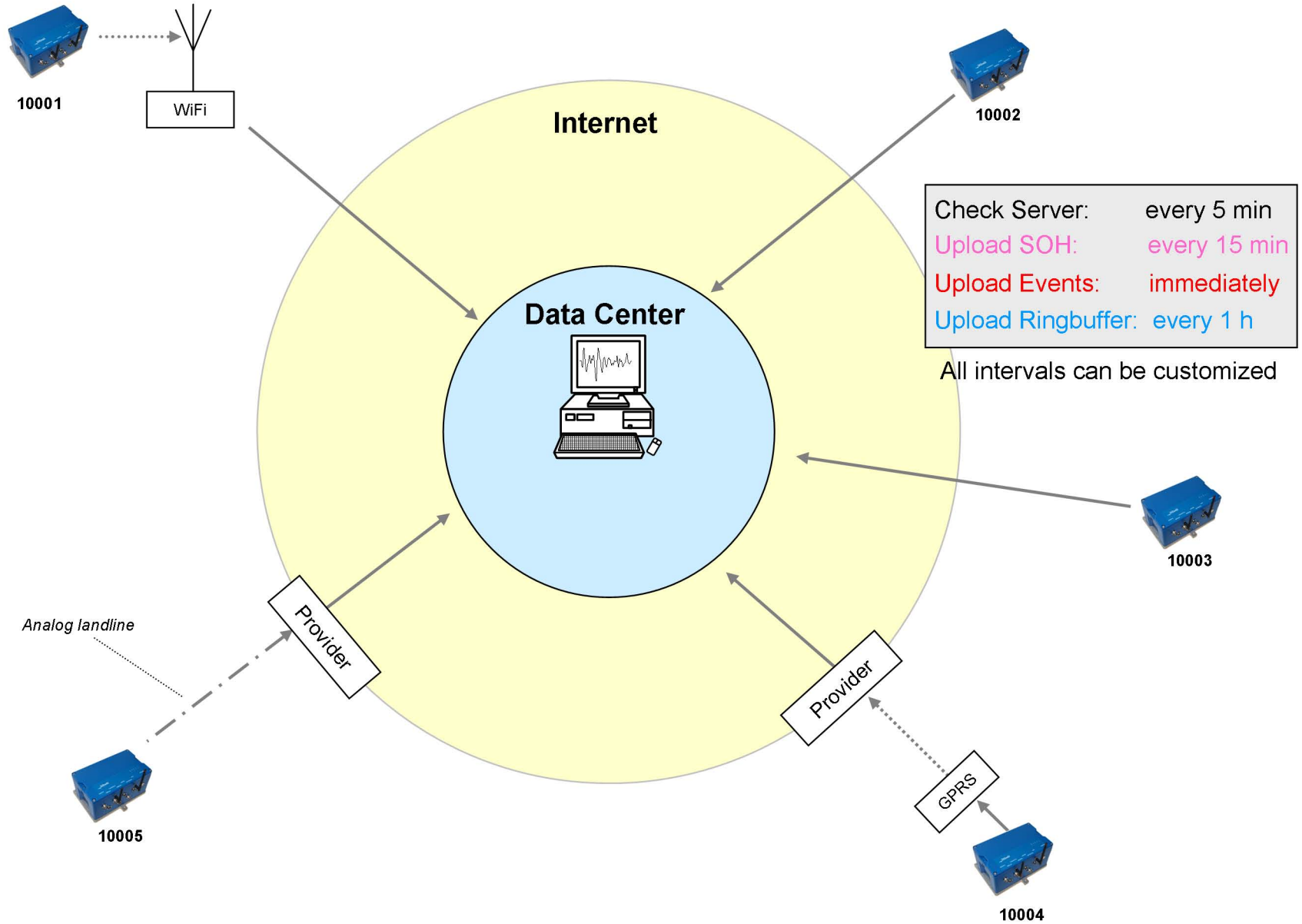
# Connectivity Options



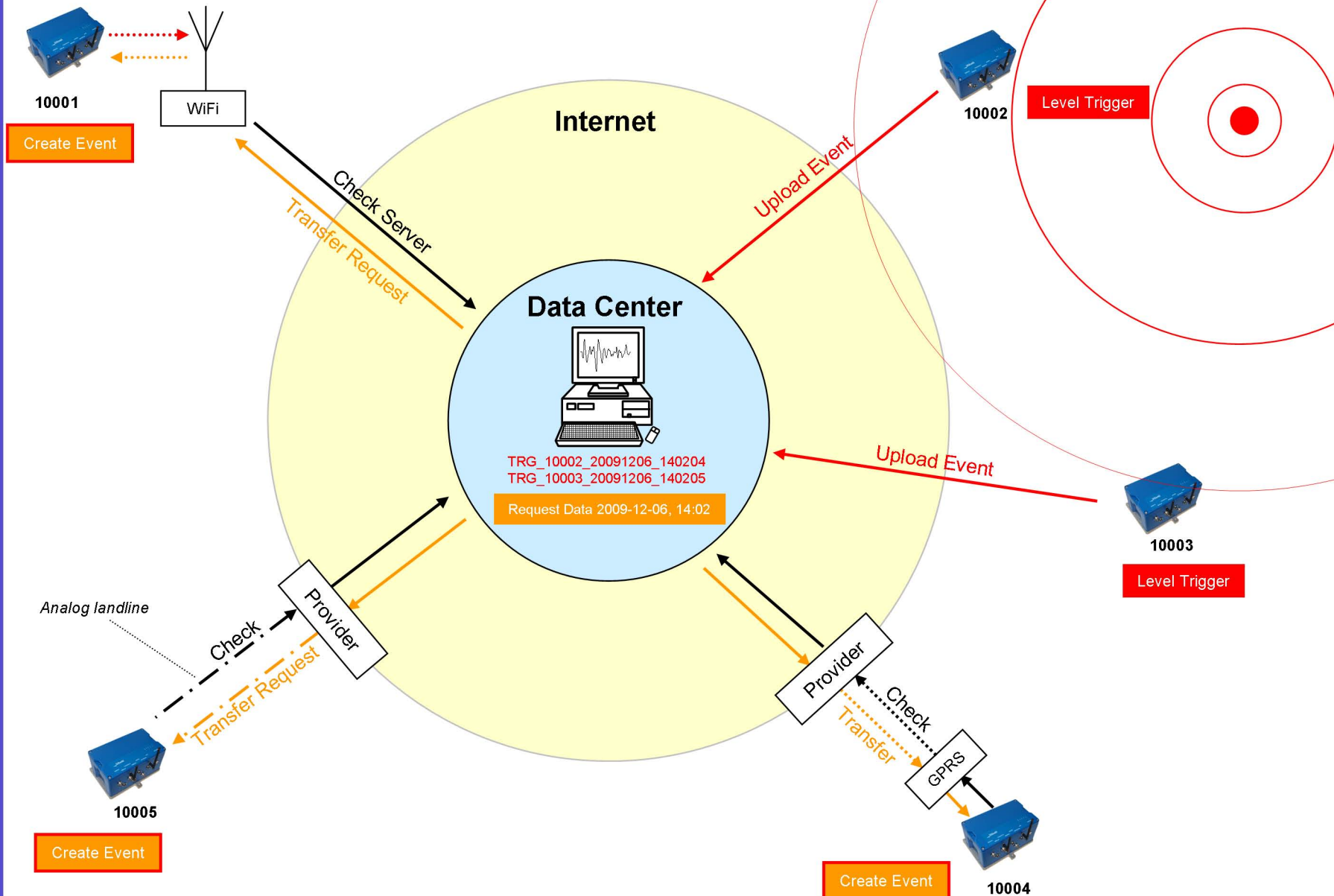
**Legend**  
— Standard connection  
 — Optional connection



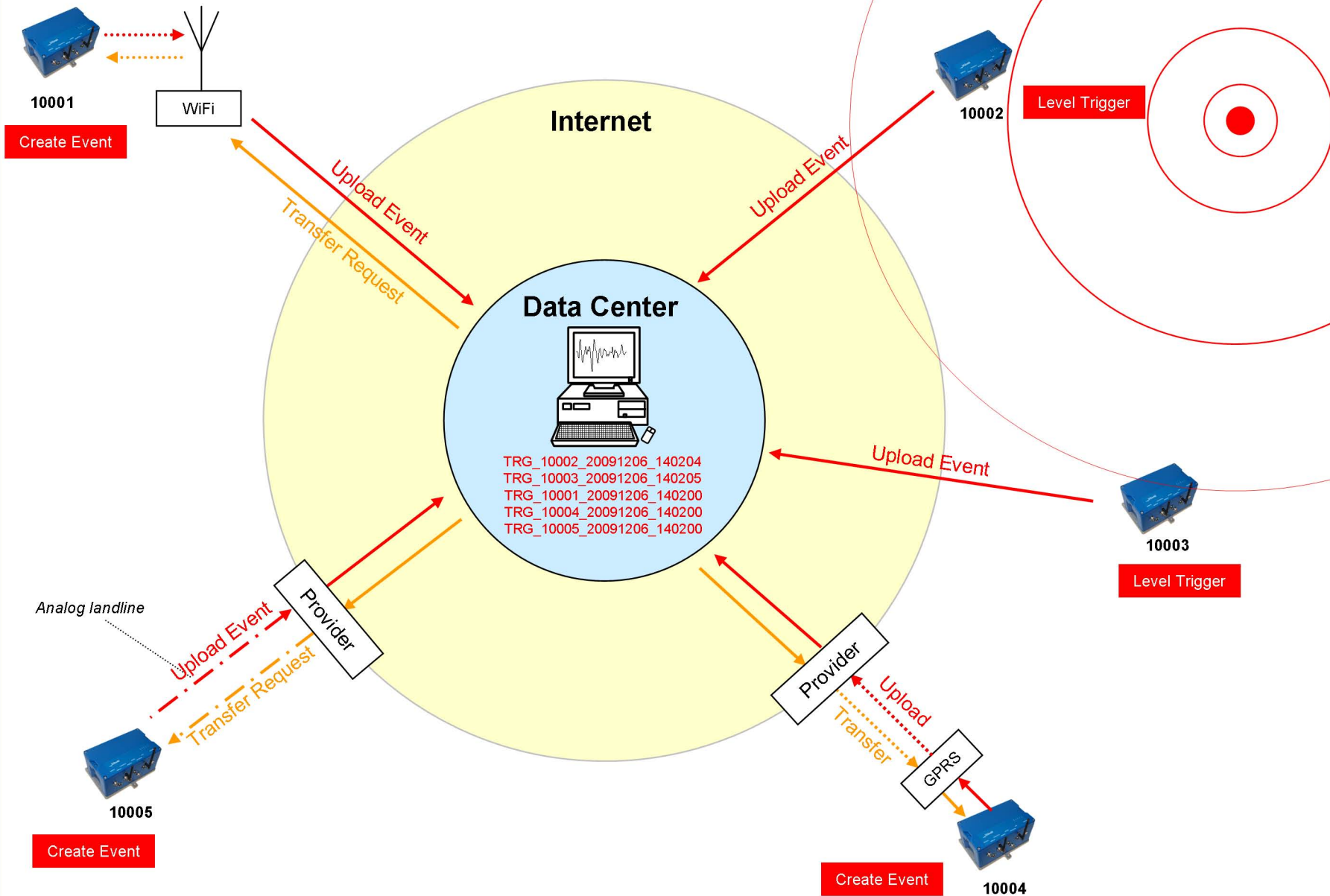
# Application – Communication



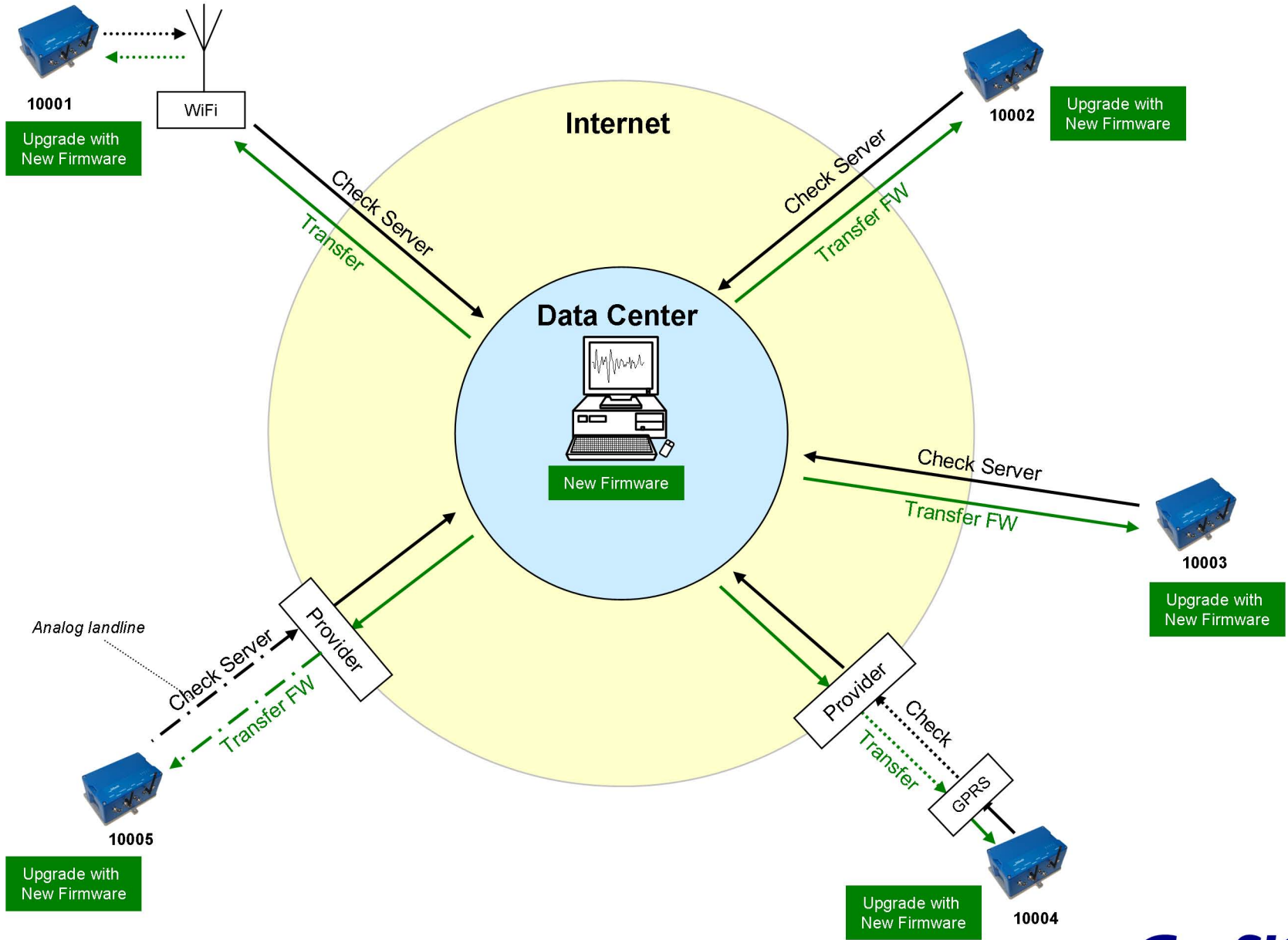
# Application – Normal Operation Event



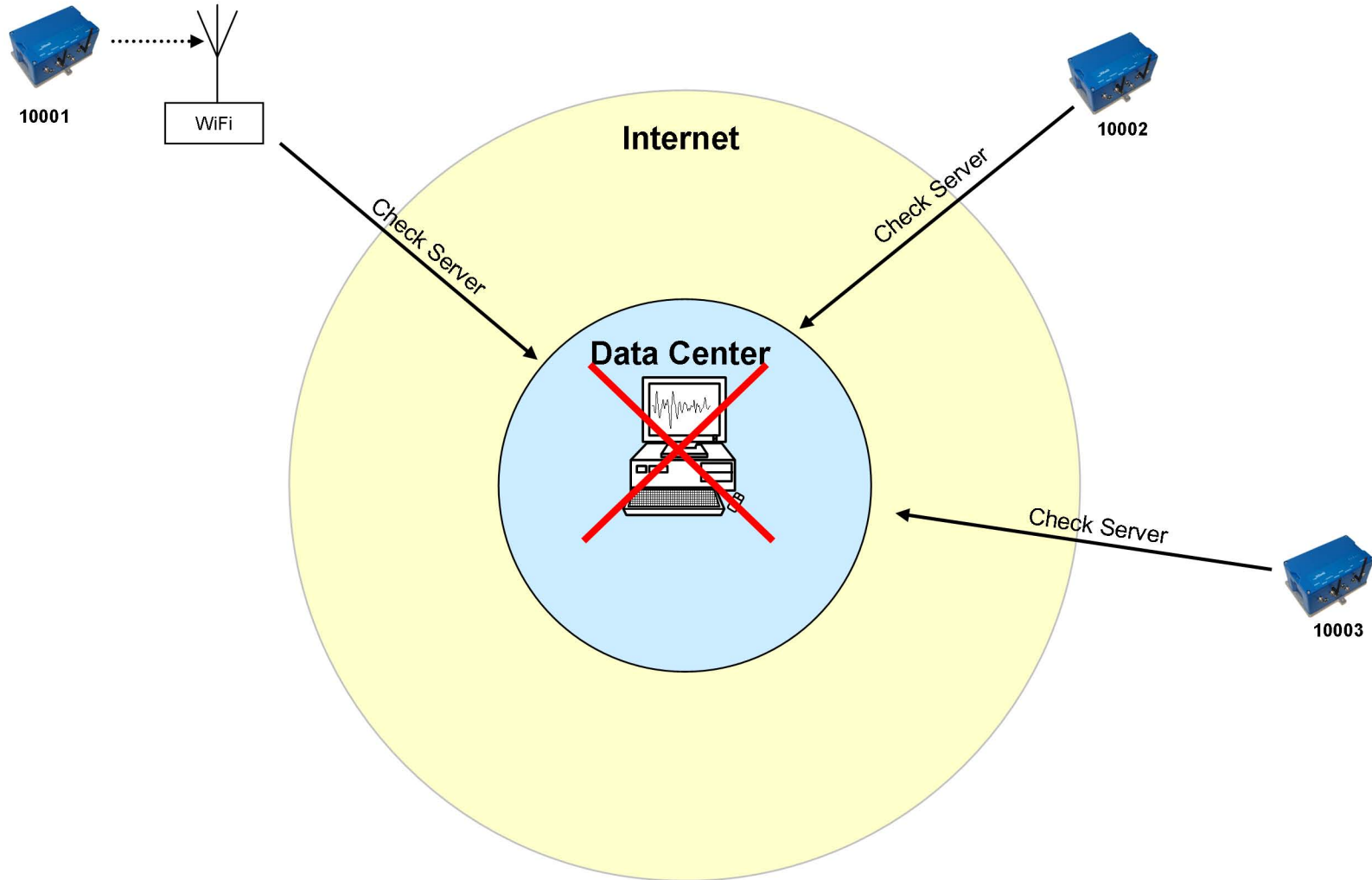
# Application – Normal Operation Event



# Application – Firmware Upgrade



# Application – Recovery / Support



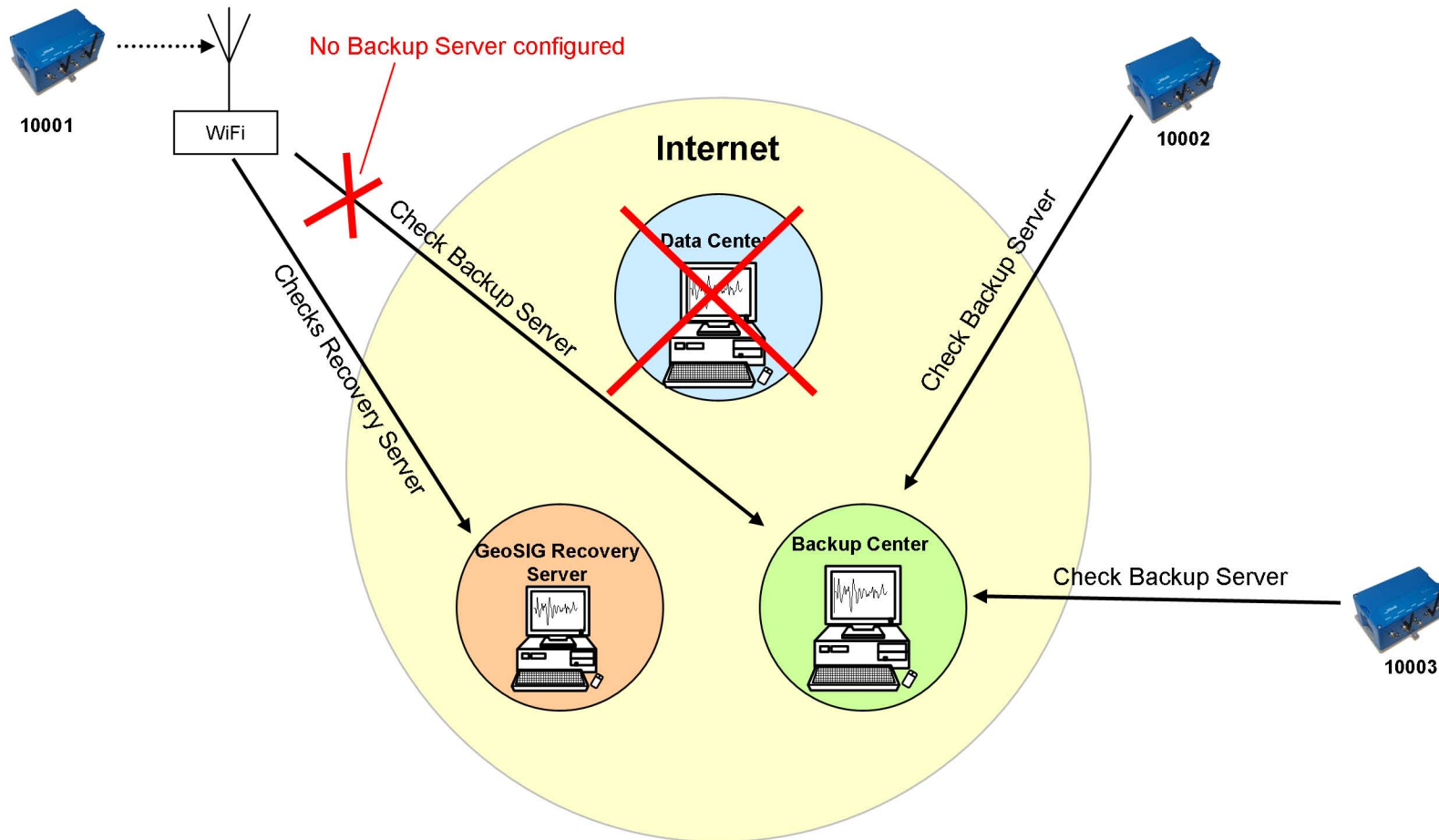
What to do in case...

... Data Center is down or

... A Configuration with a wrong Server address has been sent?



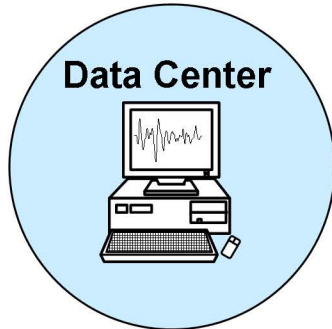
# Application – Recovery / Support



If there is no connection for 24 h to the Main Server  
→ Instrument checks Backup Server (Configured in Bootloader)  
If there is no connection to the Backup Server too  
→ Instrument checks Recovery Server (Hard coded)

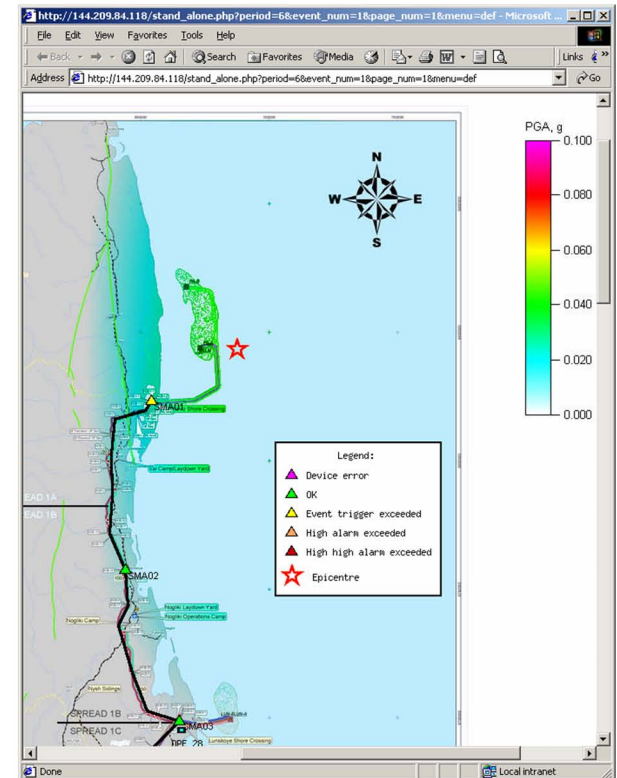
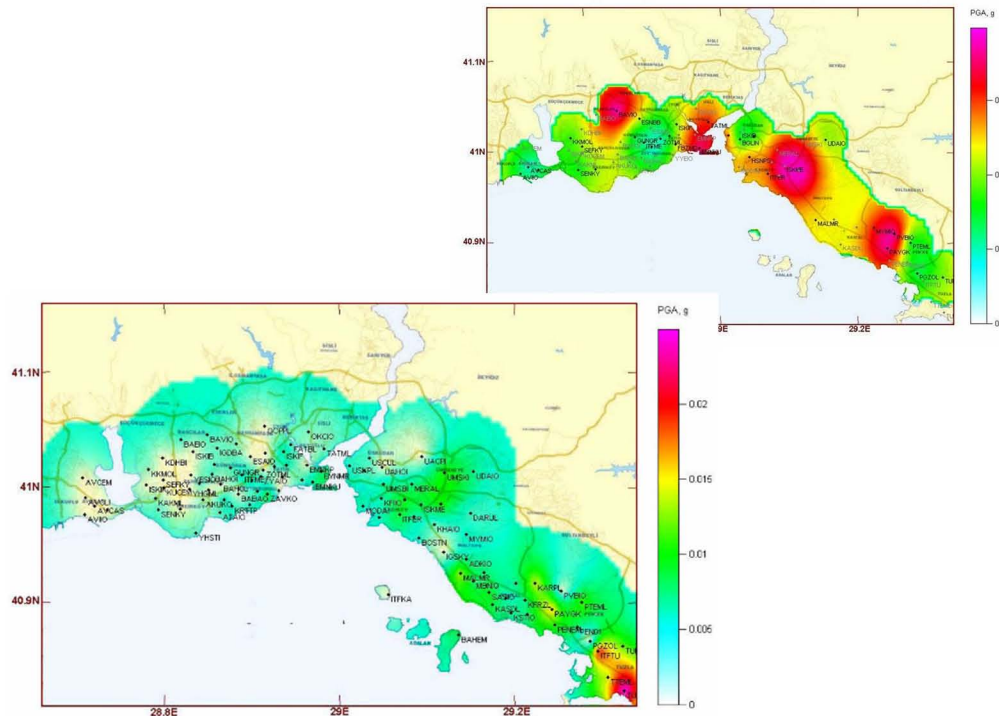
No Data will be uploaded to Backup or Recovery Server  
To recover of instrument/configuration only

# Application – Shakemap

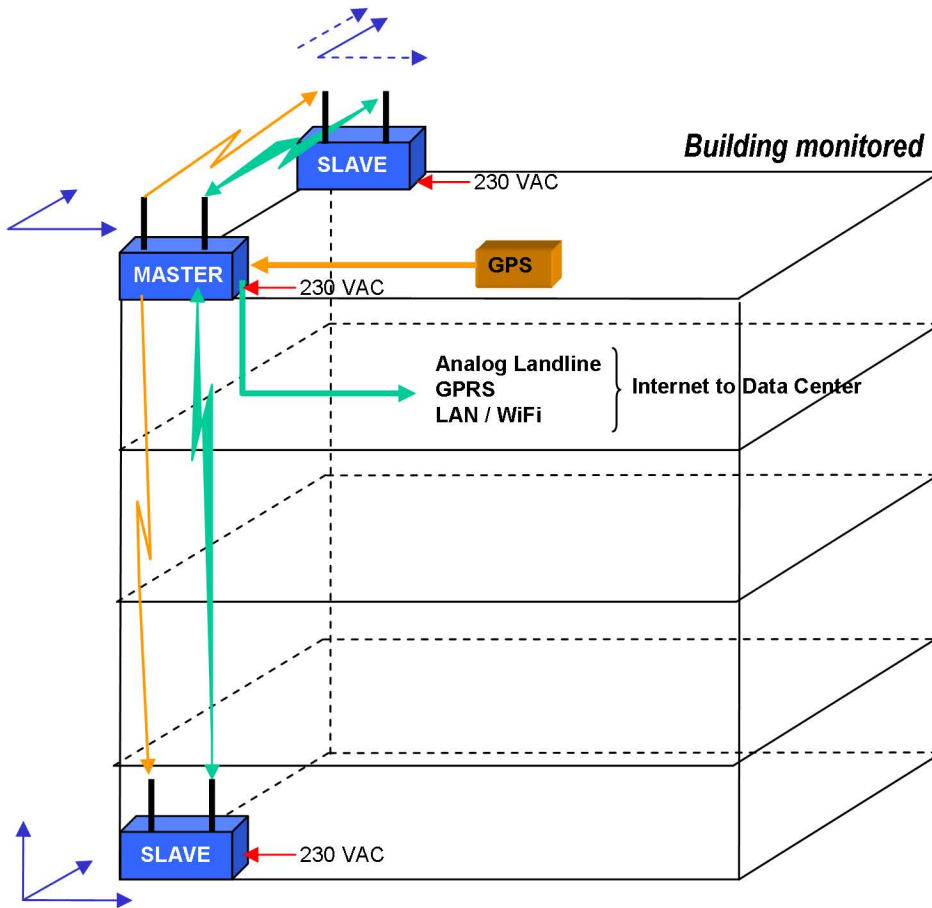


## Creation of Shakemaps

- Created with the measured data from the stations
- Improved by Epicenter Data from USGS Public Server
- Further improved by Shakemap from USGS Public Server



# Innovation – Structural Health Monitoring



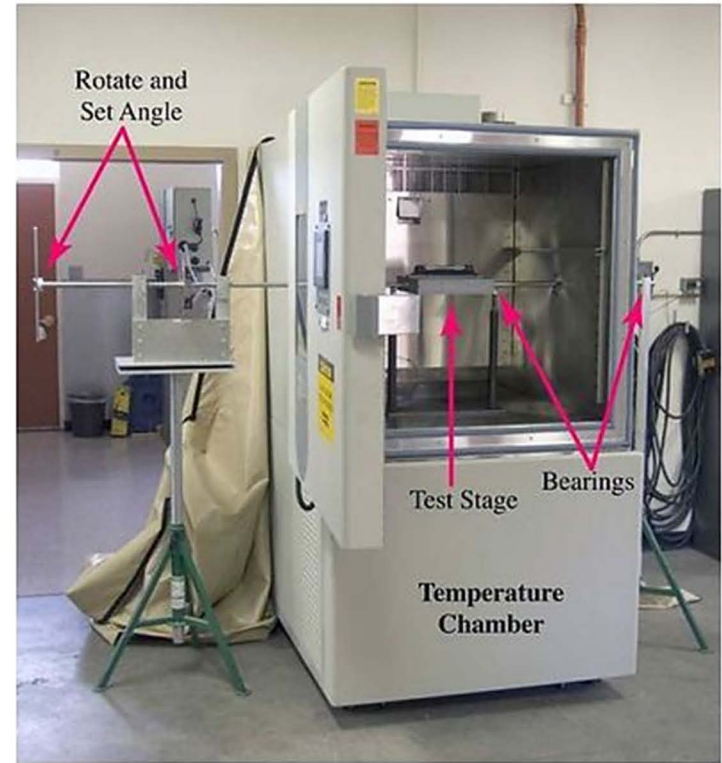
Wireless 433 MHz Synchronisation  
- Time Synchronisation  
- Source: NTP or GPS

(Wireless) Ethernet Link (LAN/ WLAN):  
- Data Transfer to Master  
- Firmware / Config Upgrades  
- Network Trigger

- Wireless Time Synchronisation and Data Communication
- No cabling between the Stations: Very fast Installation Time
- For permanent and temporary Installations
- Network Triggering
- Automatic Event Report creation
- Data Upload over LAN, WiFi, GPRS or Analog Landline
- Ring Buffer Continuous Recording

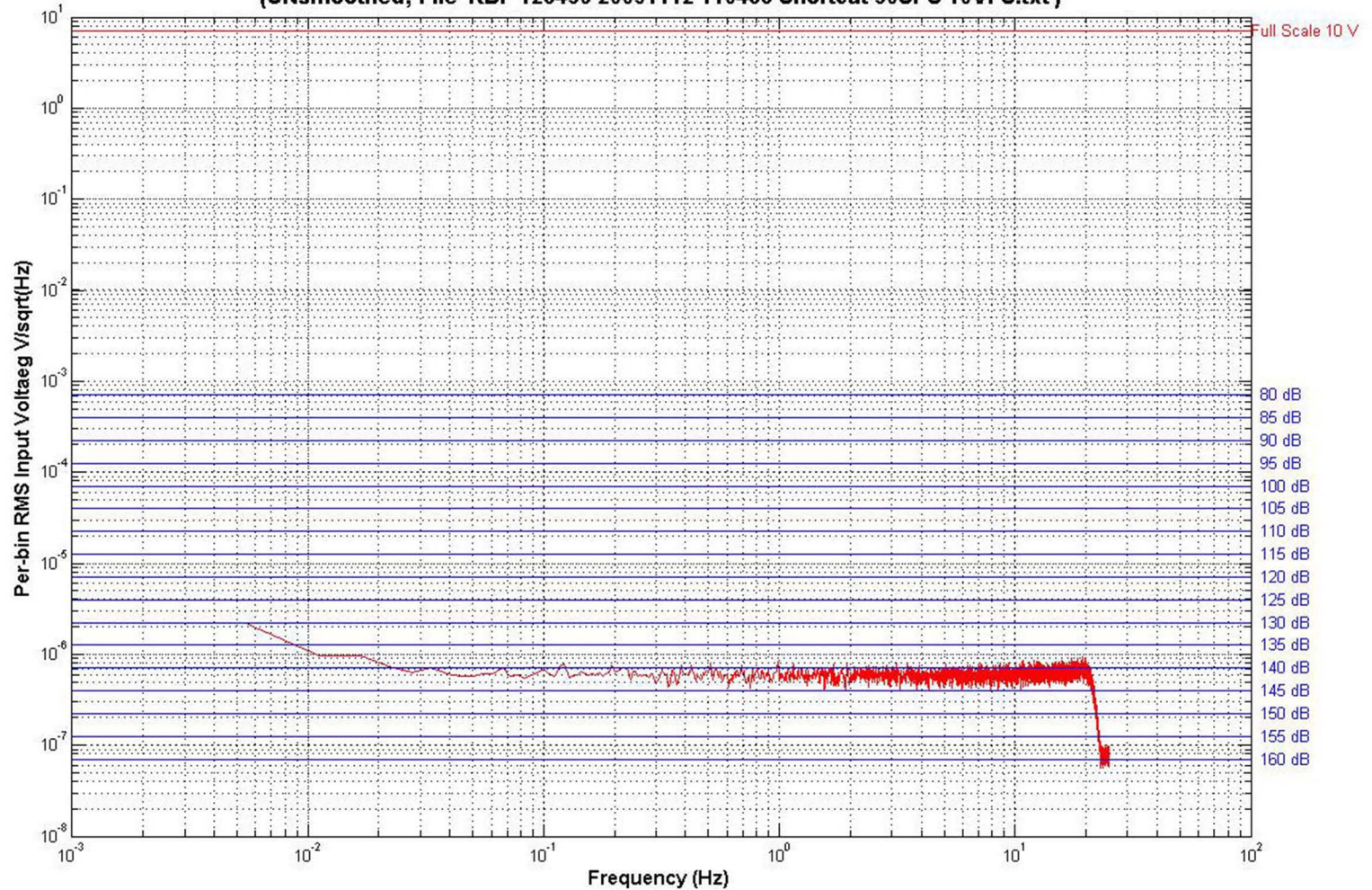


# Tests: Qualification at USGS



# Test Results: Noise of Digitiser

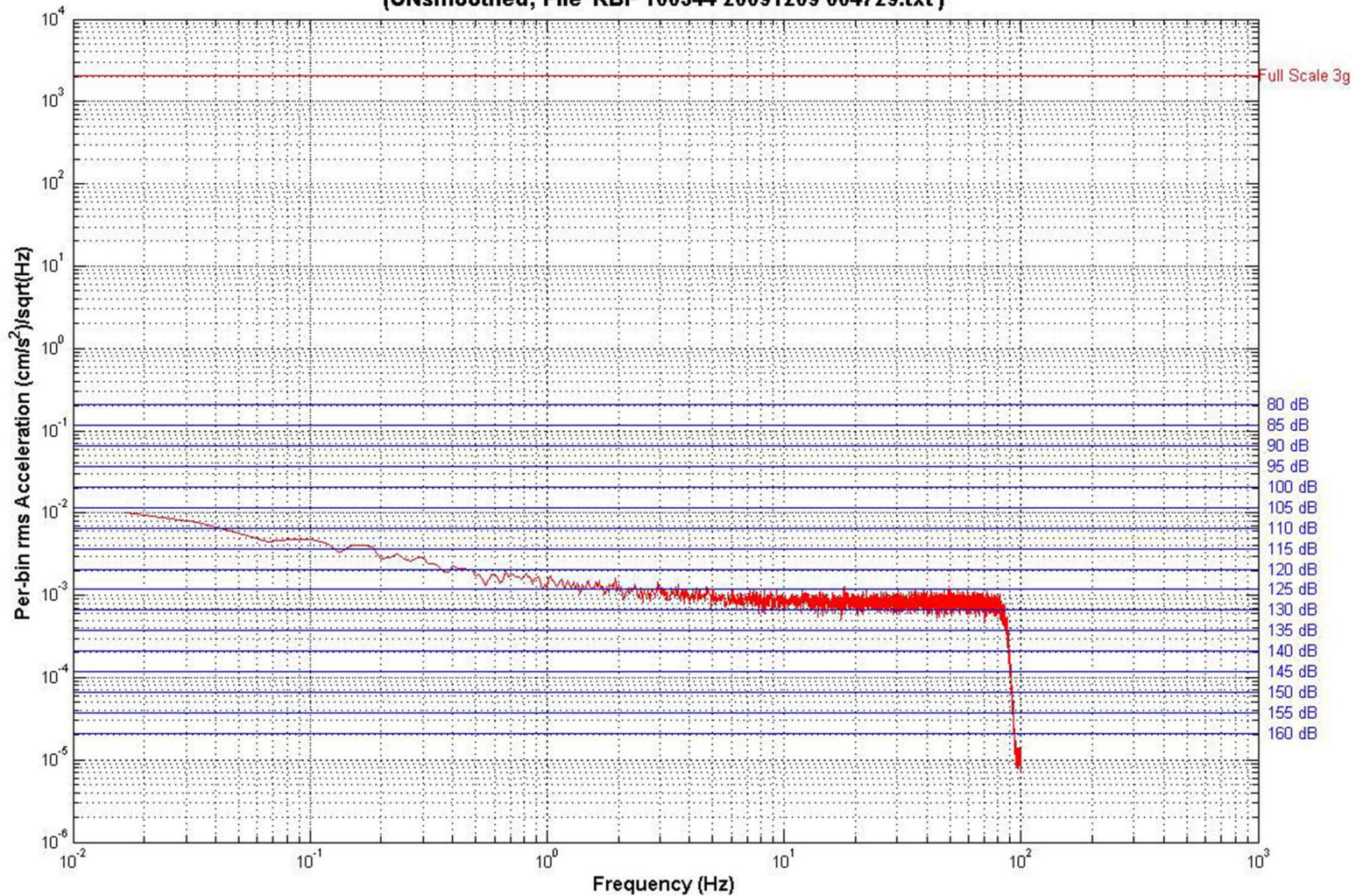
ANSS-Recommended Low-Gain Accelerometer Noise Analysis  
Digitiser GMS-18, Main Board Serial Number 121'192; Test Date 12.11.2009  
(UNsmoothed; File 'RBF 123456 20091112 110438 Shortcut 50SPS 10VFS.txt')





# Test Results: Noise of Internal Sensor

ANSS-Recommended Low-Gain Accelerometer Noise Analysis  
Sensor Model AC-63i, GMS Serial Number 100344; Test Date 09.12.2009  
(UNsmoothed; File 'RBF 100344 20091209 004729.txt')



# Tests: Qualification at USGS



The GMS-18 successfully passed the intensive USGS Testing and up to now more than 300 instruments have been purchased by USGS

David Oppenheimer, Chief of the northern california seismographic network, USGS:

Instruments were never tested that much before

“The instruments were extensively tested and we didn’t accept them until they met all the performance specs “



# Tests: EMC Test



emc testcenter.zürich.ag

EMC-TESTCENTER ZÜRICH AG  
Schaffhauserstrasse 580  
Postfach 268  
CH-8052 Zürich / Switzerland

Phone +41 44 302 45 00  
Fax +41 44 302 55 44  
email info@emc-testcenter.com  
http www.emc-testcenter.com

Accredited according to ISO / IEC 17025 by:  
Swiss Accreditation Service SAS  
Registration number 034  
Notified Body number 1932



STS 034



## TEST CERTIFICATE TEST-ZERTIFIKAT

**Product** : GeoSIG Measuring System (GMS)  
*Produkt*

**Trade mark** : GeoSIG Ltd.  
*Handelsmarke*

**Type** : GMS  
*Typ*

**Manufacturer** : GeoSIG Ltd.  
*Hersteller*  
Europa Business Center  
Ahornweg 5A, CH-5504 Othmarsingen / Switzerland

**Test results** : Ref. No.: EMCKP1325.1A  
*Testresultate*

A sample of this product was tested and found to be in conformity with the following harmonized standards:

*Ein Exemplar dieses Produktes wurde getestet und die Übereinstimmung mit den folgenden harmonisierten Normen festgestellt:*

EN 61000-6-4: 2007  
IEC 61000-6-4: 2006  
EN 61000-6-2: 2005  
IEC 61000-6-2: 2005

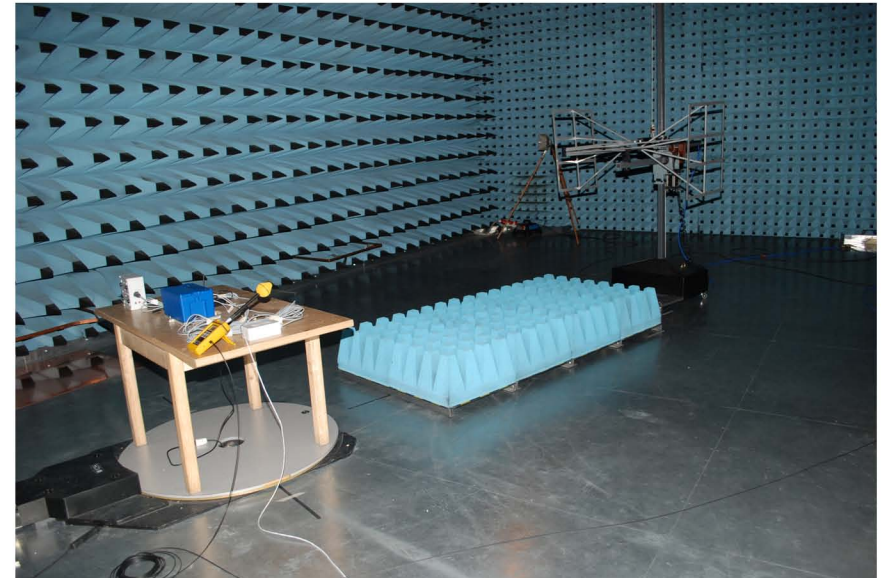
Zürich, 18. February 2009

EMC-TESTCENTER ZÜRICH AG

Max Hunziker  
General Manager Technics

Certificate No.: EMCK1325.1A

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**Thank you...**

**Questions?**

For further Information:  
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**Thank you...**