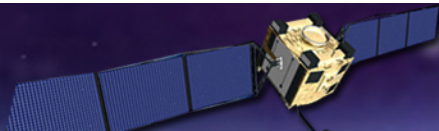




# ION GNSS SDR Metadata Standard Working Group Report

ION GNSS+  
September 18, 2015  
Tampa, FL



THE WORLD'S LEADING PROFESSIONAL ORGANIZATION FOR THE  
ADVANCEMENT OF POSITIONING, NAVIGATION AND TIMING.

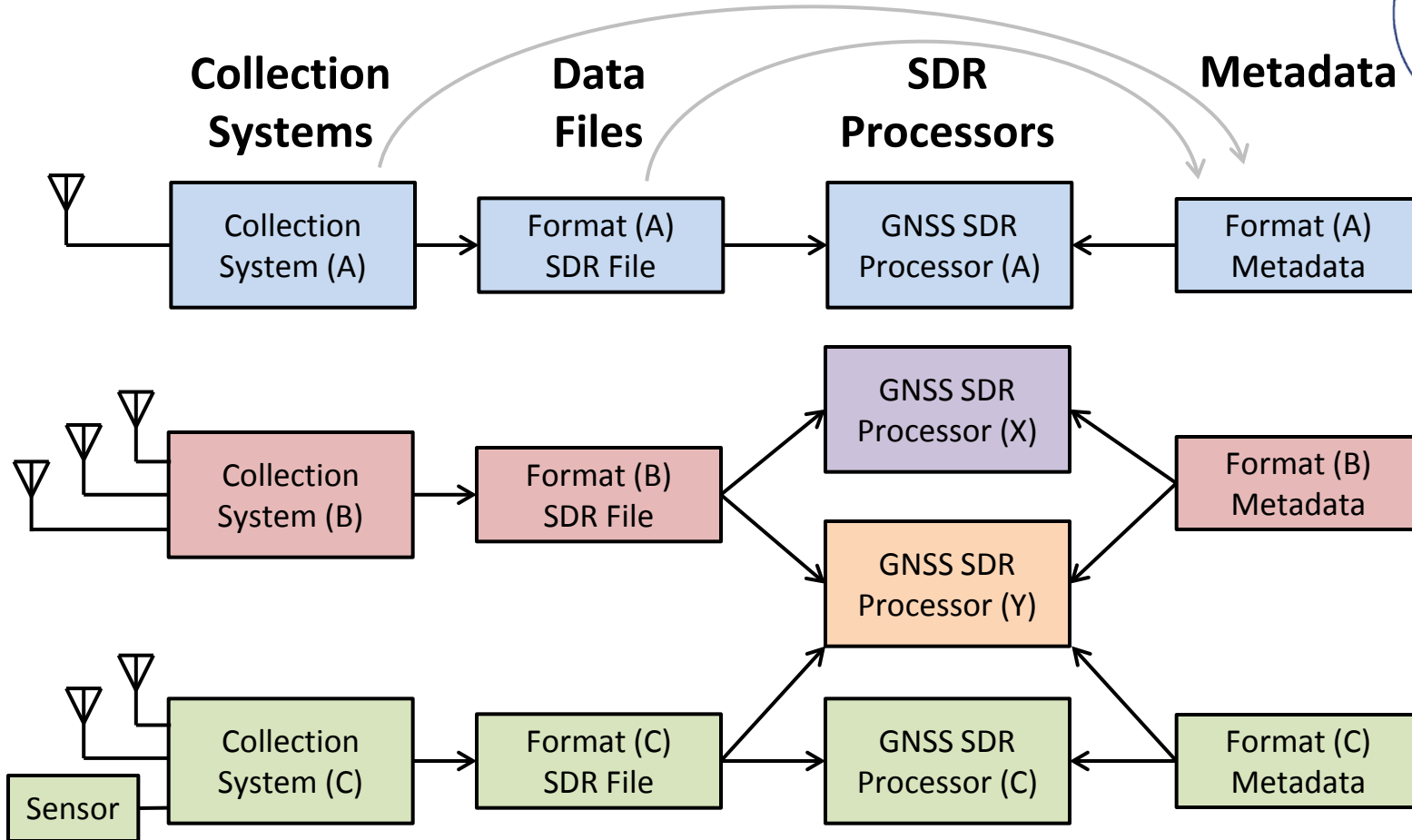
# Background



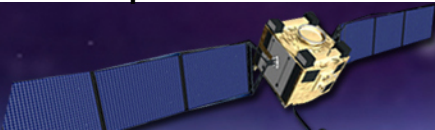
- Proliferation of GNSS SDR technology in the past 5-10 years
  - Low-cost front-end hardware and data collection systems
  - Maturing GNSS SDR processors, receivers and software frameworks
- Today: no established standard to convey GNSS SDR metadata
  - Existing metadata standards not well suited for needs of GNSS SDR and PNT community
- ION SDR Metadata Standard
  - Objective: Interoperability between GNSS SDR data collection systems and processors



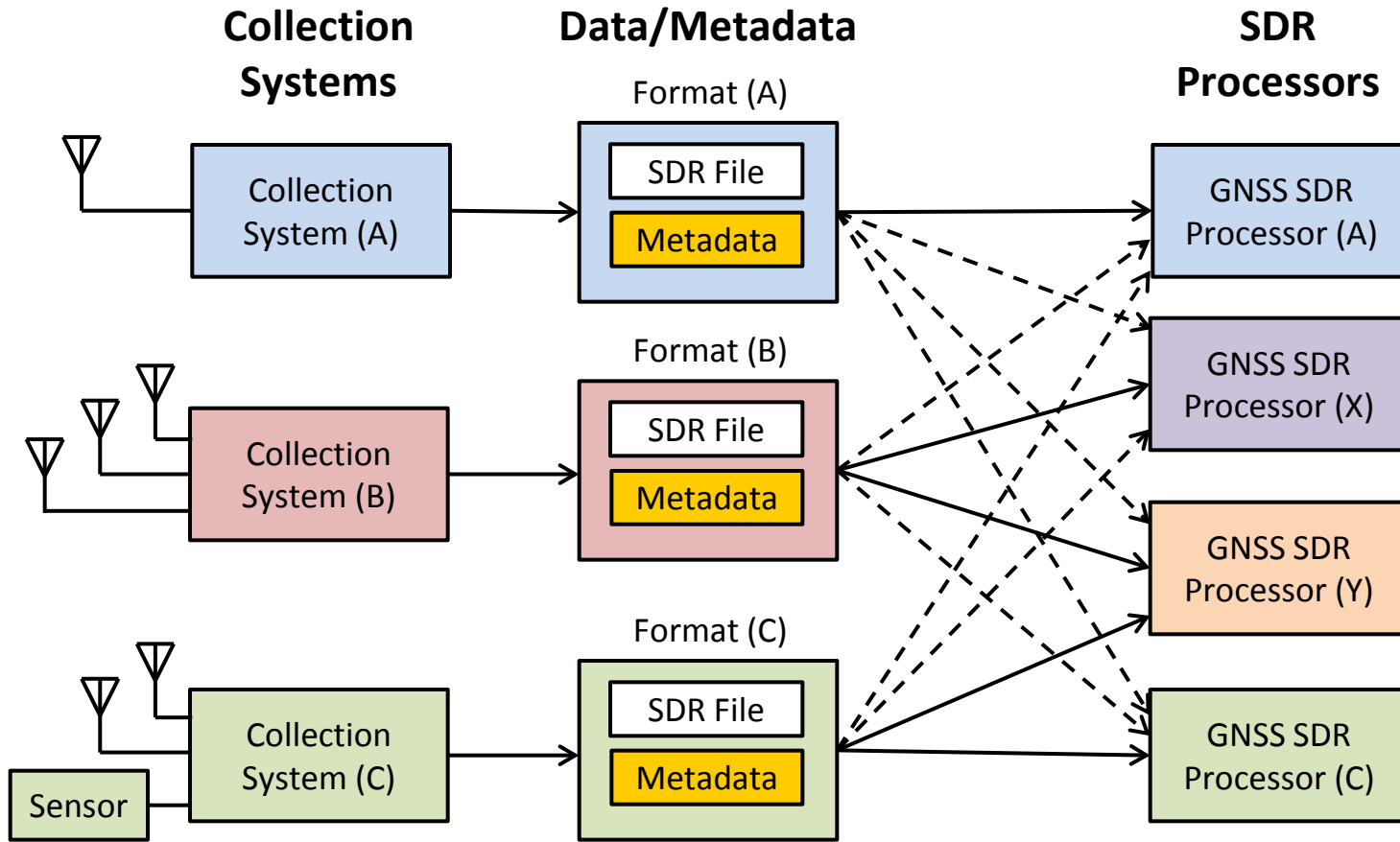
# The Problem:



- Some front-end/DCS and SDR processors are bound to one another
- Ad hoc metadata exchange – prone to human error
- Does not promote interoperability
- Does not promote data/resource sharing and re-use



# Proposed Solution: Metadata Standardization

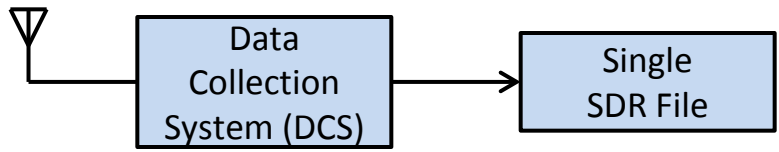


- Unambiguous transfer of all essential SDR metadata
- Standardization encourages vendors to support major formats
- Spurs community to develop open-source software handlers and plug-ins
- Promotes interoperability
- Promotes data portability, resource sharing and re-use

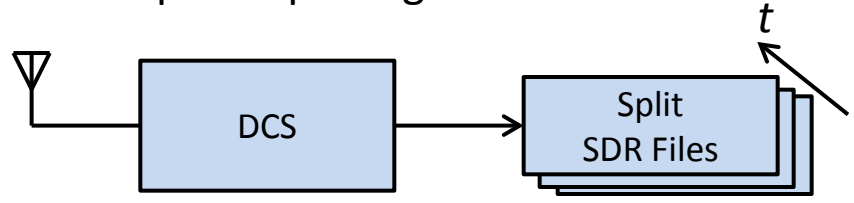


# System Topologies

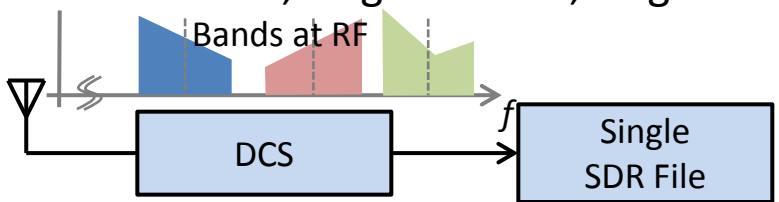
Single band, single-stream, single file



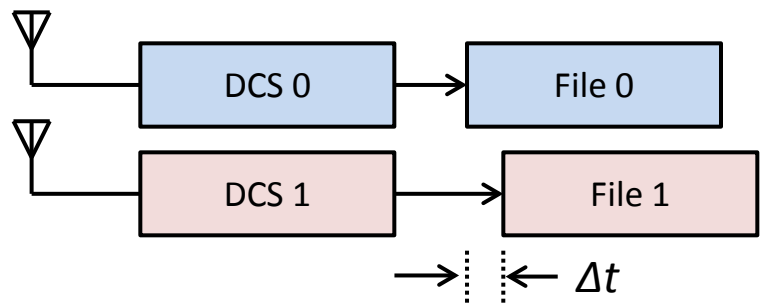
Temporal splitting of files



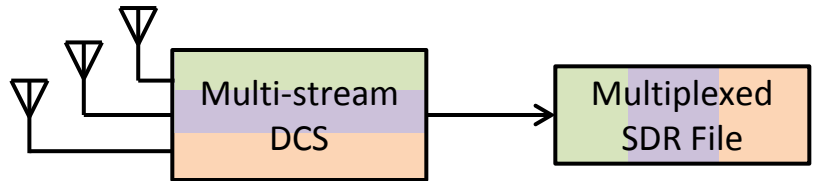
Multi-band, single-stream, single file



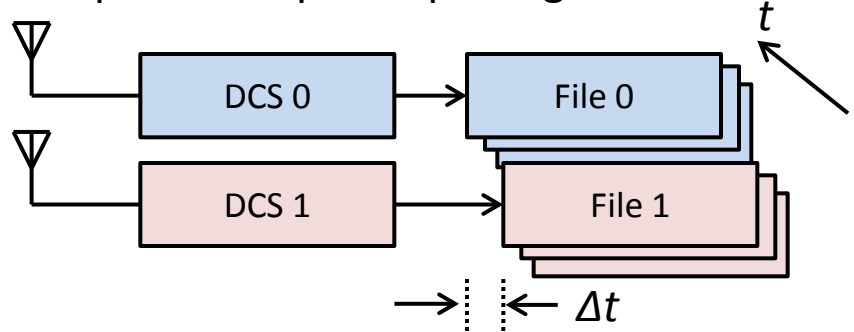
Spatial splitting of files



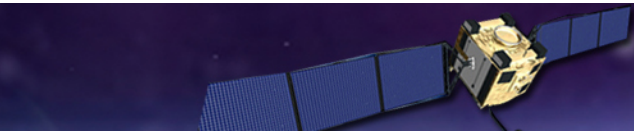
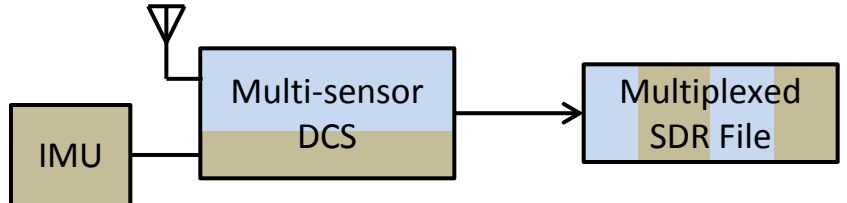
Multi-stream, single file



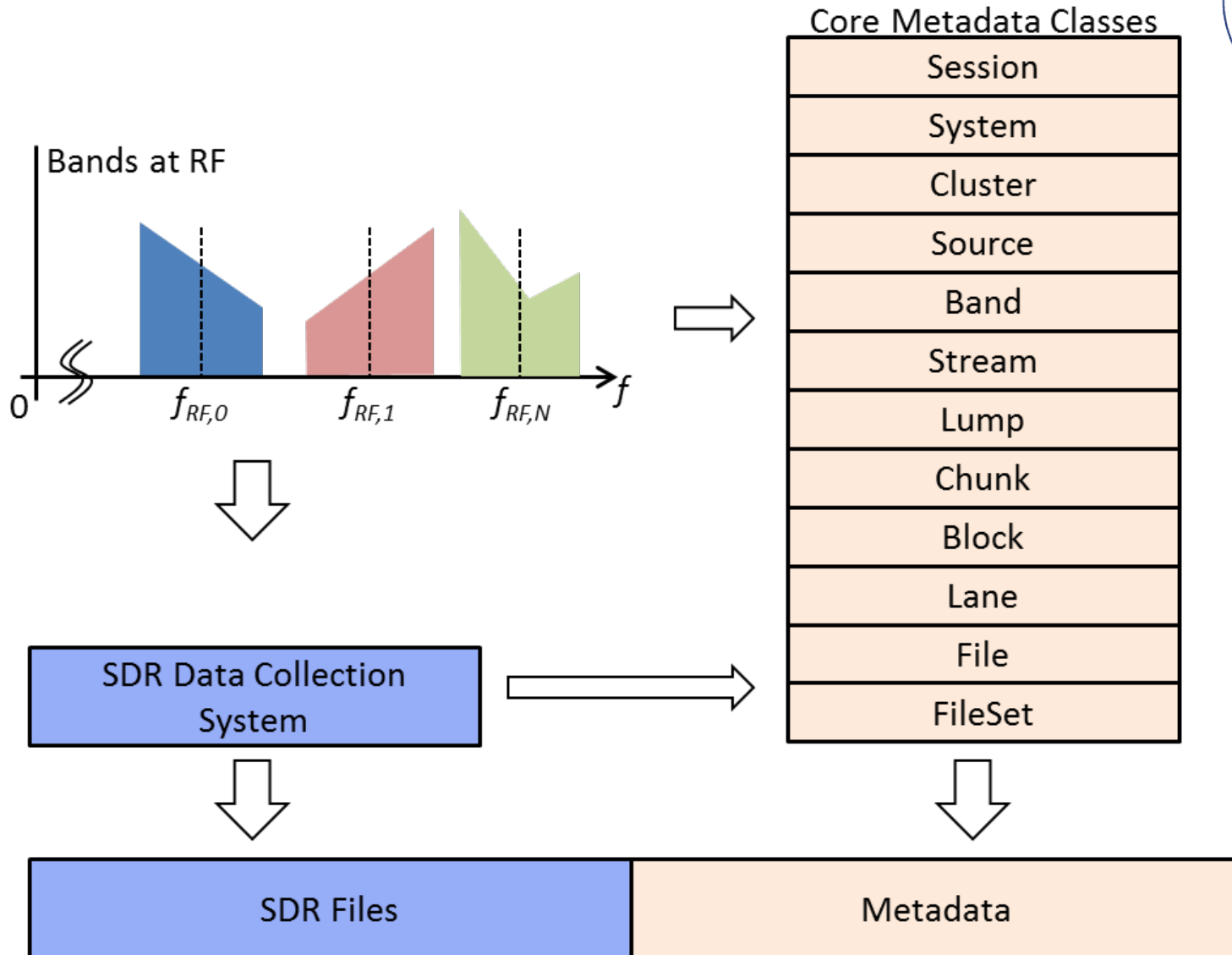
Spatial-temporal splitting



Multi-stream, single file



# Metadata Domain Model



# Standard XML Metadata



```
<?xml version="1.0" encoding="UTF-8"?>
<metadata xmlns="http://www.ion.org/standards/sdrwg/schema/metadata.xsd">
  <comment format="text">IFEN GNSS metadata converter test</comment>
  <lane id="Lane0_Band0">
    <system id="IfenRecordingSystem">
      <freqbase format="MHz">2.0480000000000000e+001</freqbase>
      <equipment>IFEN frontend type: NavPort-4</equipment>
      <types>Processor</types>
    </system>
  </block>
  <cycles>0</cycles>
  <chunk>
    <sizeword>1</sizeword>
    <countwords>1</countwords>
    <endian>Big</endian>
    <padding>None</padding>
    <wordshift>Left</wordshift>
    <lump>
      <stream>
        <ratefactor>1</ratefactor>
        <quantization>2</quantization>
      </stream>
    </lump>
  </chunk>
</metadata>
```





# SDR-WG Progress since Jan 2015

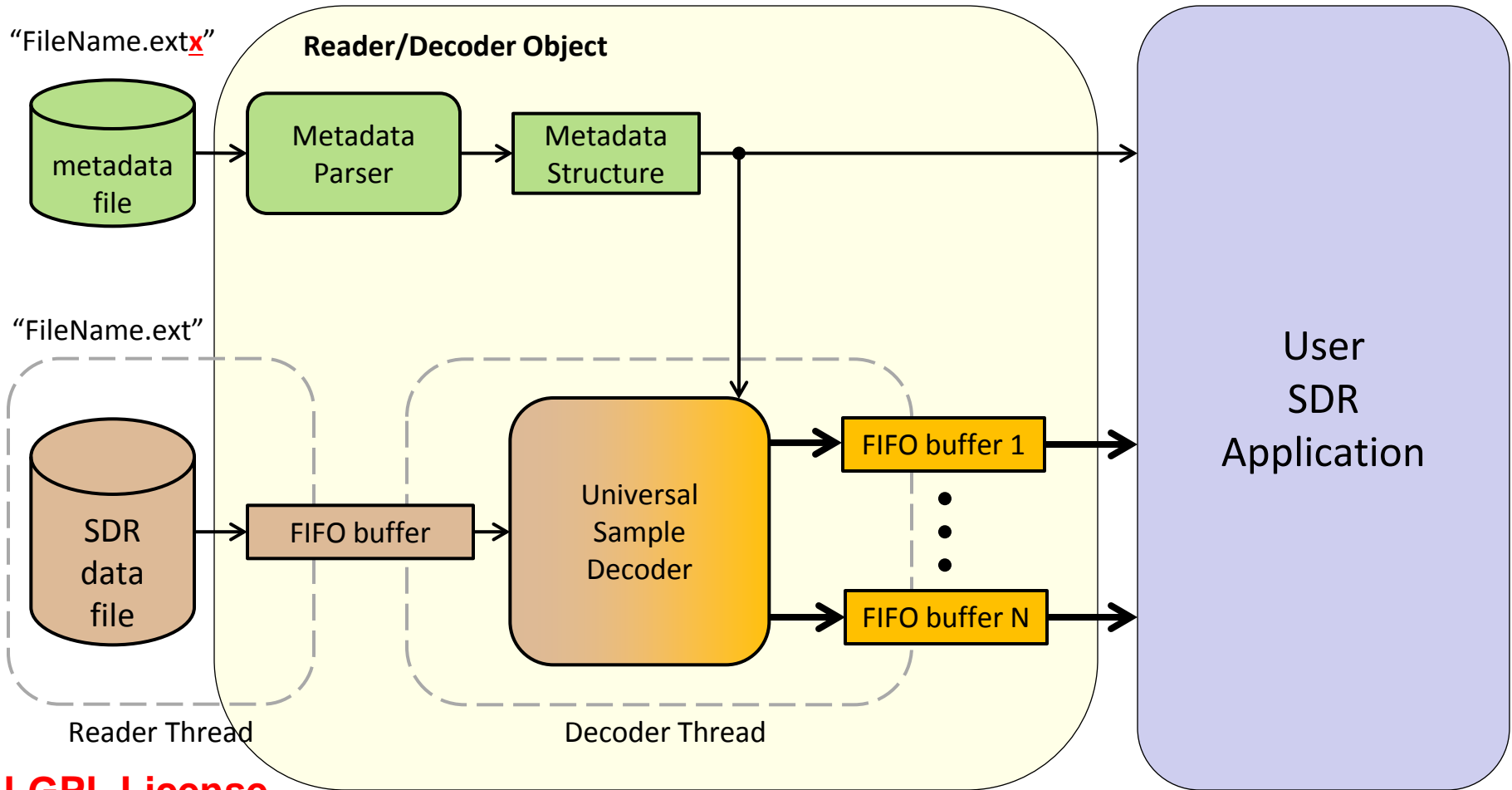


- ‘Unofficial’ draft standard available online
  - <https://github.com/IonMetadataWorkingGroup/MetadataSpec>
- C++ library to read/write the meta data
  - <https://github.com/IonMetadataWorkingGroup/API>
  - Tested by IFEN GmbH, Fraunhofer IIS and Loctronix
- Library of SDR files available on ION website
  - <http://sdr.ion.org/>
  - For testing against the standard
  - **Let us know if you want your SDR files included in this site**
- Development of software library: **‘IONSDRDecoder’**
- Development of test app: **‘IONSDRWaterfall’**
- Reports: GNSS+ 2014, ITM 2015, **GNSS+ 2015**





# IONSDRDecoder: A Standard-Compliant Reader/Decoder Library



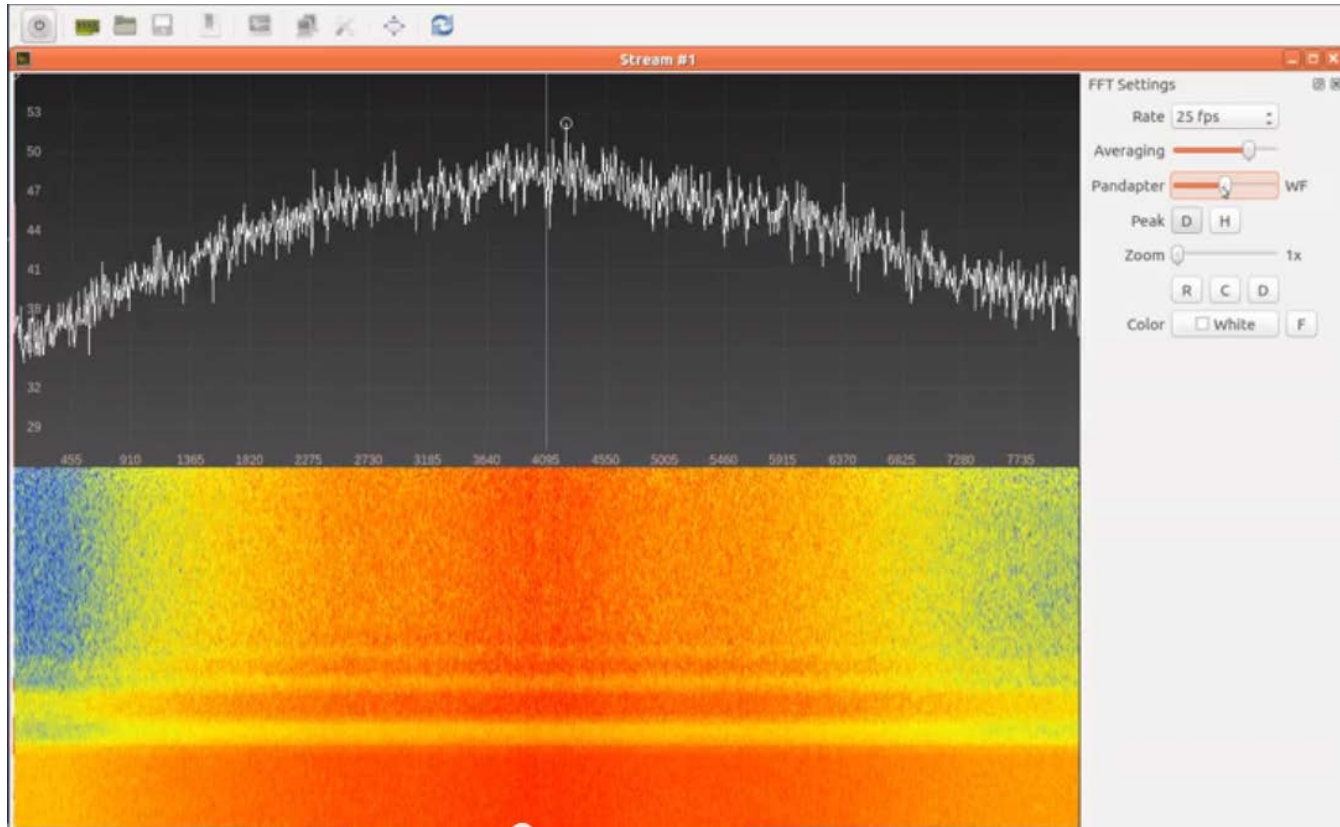
**LGPL License**



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# IONSDRWaterfall



Sample application  
utilizing provided  
libraries

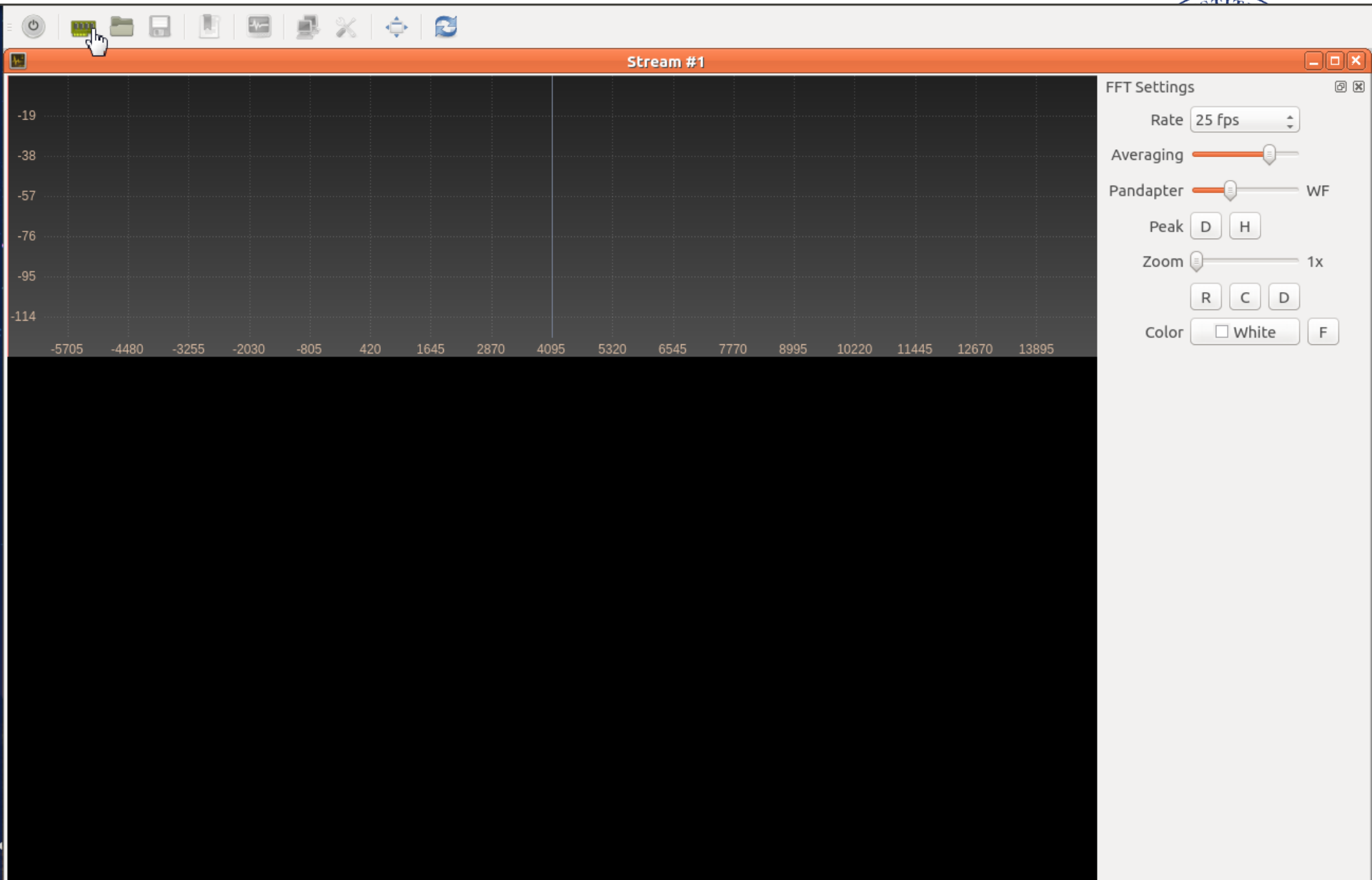
Universal software  
spectrum analyzer

Derived from Gqrx  
GPL license  
Qt framework  
Windows/LINUX

[https://drive.google.com/file/d/0B676qRA75JVmbEJETGNYU3FoRXc/view?usp=sharing\\_eid&invite=CLr1YQM](https://drive.google.com/file/d/0B676qRA75JVmbEJETGNYU3FoRXc/view?usp=sharing_eid&invite=CLr1YQM)



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# Get Involved!



- Review draft standard and provide feedback
- Download and work with software normative references and submit improvements/bug fixes
- Please participate in **official 90-day public comment and feedback process**

January 15 to April 15

at

[ION.ORG](http://ION.ORG)



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# Acknowledgements



- Thomas Pany (IFEN): WG Co-chair, Software API
- Mike Mathews (Loctronix): XSD spec., C++ API, GitHub
- Mike Braasch (Ohio U.): Geometry parameters
- Dennis Akos (U. of Colorado) & James Curran (Joint Res.Ctr.): Oscillator parameters
- WG members



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