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Dead and noisy channels masking

General description

There are some channels that don't work properly. Generally we can divide this channels into two groups:

- dead channels (do not answer)
- noisy channels (answer to much)

The purpose of dead and noisy channels masking is to exclude both groups of channels from simulation and reconstruction.

Steps that have to be taken

Out of software:

- retrieve list of dead and noisy channels
- convert this list to XML file

In Software:

- parse XML file and create AnalysisMask
- use AnalysisMask in order to exclude channels from simulation and reconstruction

The software part of dead and noisy channels masking takes place during digitalization.

Common part for every detectors

parse XML file and create AnalysisMask

This step of masking takes part directly in software. In order to parse XML and create AnalysisMask(`TotemCondFormats/DAQInformation/interface/AnalysisMask.h`) we should use DAQMappingSourceXML class (`TotemCondFormats/DAQInformation/plugins/DAQMappingSourceXML.cc`). To use this class we have to include in our configuration file a special module. We have to also provide mapping files and XML files containing dead & noisy channels. Sample configuration files will be later presented in this document.

XML file

The XML files which contain dead and noisy channels have very similar format for every detector. The differences are induced by different construction of each detector. Bellow I present sample files.

Roman Pots

```
<top>
  <arm id="0">
    <station id="2">
      <rp_detector_set id="5">
        <rp_plane id="0">
          <vfat iid="1" fullmask="yes"/>
          <vfat iid="3" fullmask="no">
```

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```
        <channel id="51"/>
        <channel id="94"/>
    </vfat>
</rp_plane>
</rp_detector_set>
</station>
</arm>
</top>
```

T1

```
<top>
  <t1_detector_set id="100">
    <t1_arm id="0">
      <t1_plane id="1">
        <t1_csc id="2">
          <t1_channel_type id="1" full_mask="no">
            <channel id="44"/>
            <channel id="55"/>
          </t1_channel_type>
          <t1_channel_type id="2" full_mask="yes"/>
          <t1_channel_type id="3" full_mask="no">
            <channel id="220"/>
            <channel id="129"/>
          </t1_channel_type>
        </t1_csc>
      </t1_plane>
    </t1_arm>
  </t1_detector_set>
</top>
```

Configuration file

In reconstruction dead and noisy channels are always excluded. However in simulation it is not necessary, hence a special flag indicating whether we want to simulate dead channels or not was introduced. To simulate dead channels it is necessary to add to a configuration file following part:

```
process.load('TotemCondFormats.DAQInformation.DAQMappingSourceXML_cfi')

# mapping files
process.DAQMappingSourceXML.mappingFileNames.append('TotemCondFormats/DAQInformation/data/rp_220.')
process.DAQMappingSourceXML.mappingFileNames.append('TotemCondFormats/DAQInformation/data/rp_147.')
process.DAQMappingSourceXML.mappingFileNames.append('TotemCondFormats/DAQInformation/data/t1_all.')
process.DAQMappingSourceXML.mappingFileNames.append('TotemCondFormats/DAQInformation/data/t2_4qua')

# mask files
process.DAQMappingSourceXML.maskFileNames.append('TotemCondFormats/DAQInformation/data/deadChanne')
process.DAQMappingSourceXML.maskFileNames.append('TotemCondFormats/DAQInformation/data/deadChanne')
process.DAQMappingSourceXML.maskFileNames.append('PATH_TO_T1_DEAD_CHANNEL_LIST') #load configura

process.T1Digis.simulateDeadChannels = cms.bool(True) #this flag (set to true) indicates that we
process.RPSiDetDigitizer.simulateDeadChannels = cms.bool(True) #this flag (set to true) indicates
#into account dead channels for RP
```

Sections for each detector

- Roman Pots
- T1

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-- JakubSmajek - 02-Sep-2011

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