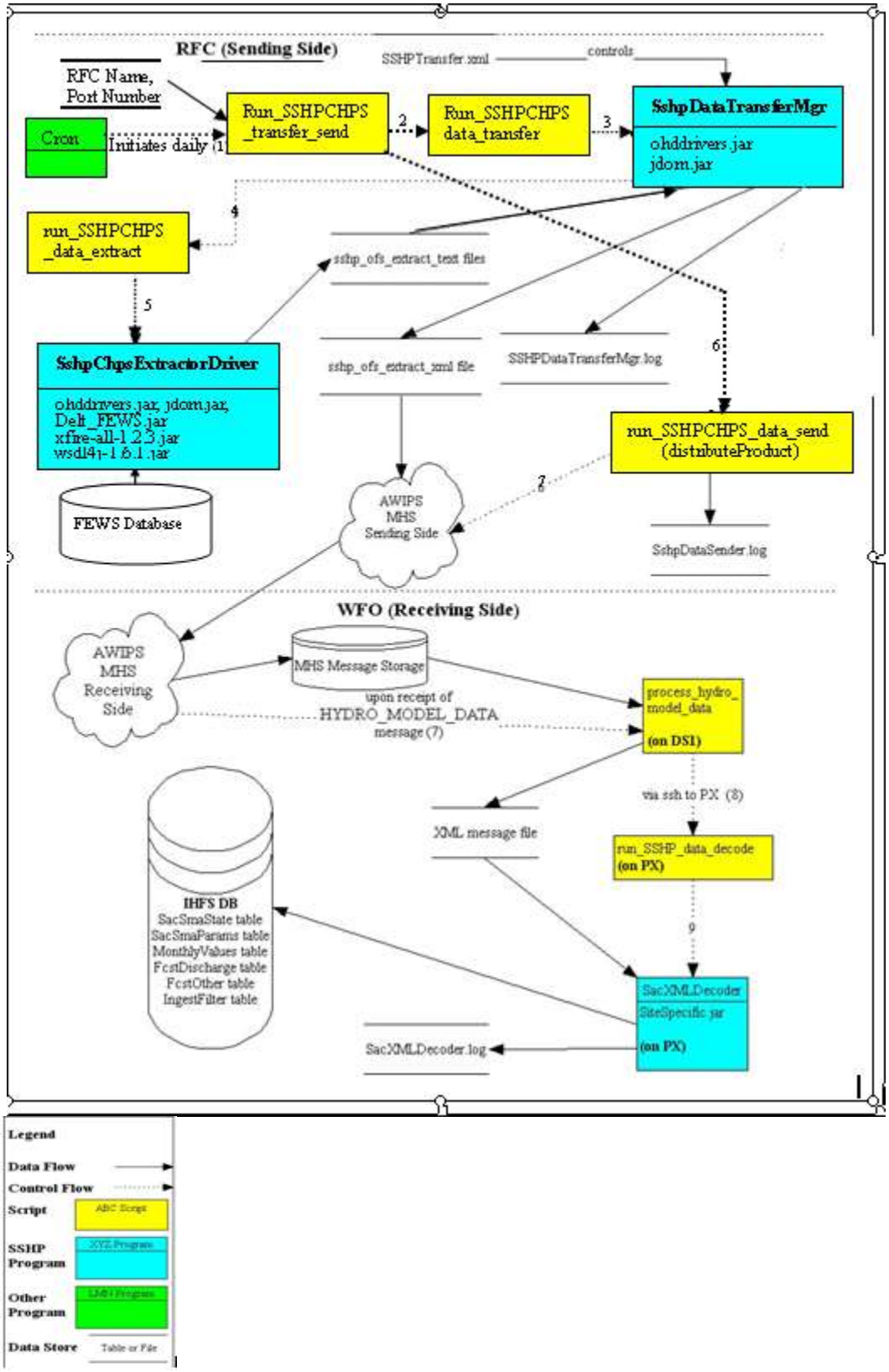
SSHP Data Transfer

Description of Algorithm

http://www.weather.gov/ohd/hrl/nwsrfs/users_manual/part2/_pdf/24unithg.pdfIn order to keep the SAC-SMA model states up-to-date and to provide other necessary input data, the SSHP Data Transfer process moves data from the FEWS database at an RFC to the IHFS database at a WFO. The transfer process is executed once per day, after the forecast model and update states run at the RFC have completed.

Description	**Data Source at RFC**	**Destination table at WFO in IHFS DB**
SAC-SMA state variables	FEWS DB	SacSmaState
SAC-SMA parameters	FEWS DB	SacSmaParams
MAPE adjustment values (12 monthly values) OR ET-demand curve (12 monthly values)	FEWS DB	MonthlyValues
Prior Computed Runoff (INFW time series)	FEWS DB	FcstDischarge
MAPE Time Series (optional)	FEWS DB	FcstOther

1.1 Data Transfer Process



1.2 Sending Side (RFC) in FEWS Environment

1. Cron script runs once per day and should be scheduled at least 5 minutes after the forecast model and update states run have completed. Cron at an RFC invokes *run_SSHPCHPS_transfer_send***,** which extracts data from FEWS database and sends an XML data file (via the AWIPS Message Handling System) to each WFO. The WFOs, moduleInstanceId (SEGMENTID_OPERATIONID), and WFO forecast points involved are configured in the control file:

   */awips/hydroapps/whfs/local/data/app/sshp/**SSHPCHPSTransfer.xml** file*. See control file format below.

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<SSHPTransfer>
  <wfo>
    <name>SJU</name>
    <mhsId>SJU</mhsId>
    <productId>KSJURRMALR</productId>
    <fcstPoint>
      <moduleInstanceId>RPOP4_RPOP4</moduleInstanceId>
      <ihfsLocId>RPOP4</ihfsLocId>
      <ihfsBasinId>RPOP4</ihfsBasinId>
      <sendMapeTimeseries>NO</sendMapeTimeseries>
    </fcstPoint>
    <fcstPoint>
      <moduleInstanceId>CAGP4_CAGP4</moduleInstanceId>
      <ihfsLocId>CAGP4</ihfsLocId>
      <ihfsBasinId>CAGP4</ihfsBasinId>
      <sendMapeTimeseries>NO</sendMapeTimeseries>
    </fcstPoint>
  </wfo>

   <wfo>
    <name>ABC</name>
    <mhsId>ABC</mhsId>
    <productId>KABCRRMALR</productId>
    <fcstPoint>
      <moduleInstanceId>DEFV1_DEFV1UPR</moduleInstanceId>
      <ihfsLocId>DEFV1</ihfsLocId>
      <ihfsBasinId>DEFV1</ihfsBasinId>
      <sendMapeTimeseries>NO</sendMapeTimeseries>
    </fcstPoint>
    <fcstPoint>
      <moduleInstanceId>GHIV1_GHIV1UPR</moduleInstanceId>
      <ihfsLocId>GHIV1</ihfsLocId>
      <ihfsBasinId>GHIV1</ihfsBasinId>
      <sendMapeTimeseries>NO</sendMapeTimeseries>
    </fcstPoint>
  </wfo>
</SSHPTransfer>
```

Element descriptions:

<SSHPTransfer> - mandatory root node

<wfo> - For each WFO to which the RFC wants to send data, there will be 1 WFO element. It will contain the following sub-elements: <name>, <mhsId>, <productId>, and <fcstPoint>. There may be multiple <fcstPoint> elements.

<name> - The abbreviated name of the WFO.

<mhsId> - The AWIPS Message Handling System Id for the WFO.

<productId> - The Product Id to use with distributeProduct.

<fcstPoint> - The element that represents the information used to pull data out of OFS and send it with the correct information to the WFO. It contains the sub-elements: <moduleInstanceId>, <ihfsLocId>, <ihfsBasinId>, <sendMapeTimeseries>.

<moduleInstanceId> - Contains the name of the OFS segment id and operation id from which data will be extracted for this particular forecast point.

<ihfsLocId> - Contains the location id of the forecast point as stored in the WFO's IHFS database.

<ihfsBasinId> - Contains the basin id associated with the forecast point as stored in the WFO's IHFS database. The MAPE data will be associated with this basinId. This should be the same basinId used for the MAP basin at the WFO.

<sendMapeTimeseries> - Contains values (YES or NO), determines if the data extraction program will attempt to extract MAPE time series data. If so, then there will be an MAPE time series sent along with Monthly Adjustment factors. If not, then an MAPE demand curve will be sent.

On the sending side, some intermediate files will have been created in:

/awips/hydroapps/whfs/local/data/sshp_transfer/ofs_extract_text
/awips/hydroapps/whfs/local/data/sshp_transfer/ofs_extract_xml

2. run_SSHPCHPS_transfer_send – need two command line arguments RFC name and port number. It used to call the run_SSHPCHPS_data_transfer and run_SSHPCHPS_data_send scripts.

   2.1. run_SSHPCHPS_data_transfer – The rfcname, port number, sshp control directory, sshp log directory, extract text directory and extract xml directory command line arguments passed into this script then starts *java ohd.hseb.ohdutilities.sshp.messaging.SshpDataTransferMgr*

   Which then calls:

   2.1.a. *run_SSHPCHPS_data_extract* (script to use the FEWS pi service to extract data from FEWS database and to call o*hd.hseb.ohdutilities.sshp.sshpChpsExtractor.SshpChpsExtractorDriver)* on moduleInstanceId as defined in the SSHPCHPSTransfer.xml file. This creates files in
   /awips/hydroapps/whfs/local/data/sshp_transfer/ofs_extract_text

   2.1.b. *ohd.hseb.ohdutilities.sshp.messaging.XmlSacEncoder* (within same Java process) which creates one xml data file per targeted WFO in
   /awips/hydroapps/whfs/local/data/sshp_transfer/ofs_extract_xml

   2.2. run_SSHPCHPS_data_send invokes *distributeProduct* and sends the data files over the AWIPS WAN via the Message Handling System (MHS); copies the extracted files to */awips/hydroapps/whfs/local/data/sshp_transfer/outgoing*

1.3 Receiving Side (at each targeted WFO) in FEWS Environment

N/A

Utility Parameters

The SAC-SMA parameters retrieve a string PI Parameters xml from FEWS database via FEWS Pi Service. Some SAC-SMA parameters definition is used by SSHP Data Transfer that defined at section 2 (Model Parameters - Models/Sacramento_Soil_Moisture_Accounting)

Utility States

The SAC-SMA model states file retrieves from FEWS database via FEWS Pi Service. Models/Sacramento_Soil_Moisture_AccountingSee the model state property at section 3 (Model States - Models/Sacramento_Soil_Moisture_Accounting)

Utility Time Series

The SSHP Data Transfer uses runoff (required) and potential evaporation (optional) time series from SAC-SMA model. The time series retrieve a string PI input xml from FEWS database via FEWS Pi Service.

Input TimeSeries:

Time Series Type	**Internal Model Units**	**Time Step**	**Missing Values Allowed**	**Required [Yes or No]**
INFW	MM	Any	No	Yes
MAPE	MM	Fixed to 24	No	No

3. Notes about configuring Pi Service in FEWS

The SSHP Data Transfer utility runs the FEWS PI Service as a backend process (without user interface) by using a script *fews_piservice.sh*. Information about this FEWS PI Service can be found at http://public.deltares.nl/display/FEWSDOC/Fews+PI+service

There are several configuration xml files need to setup before running *fews-piservice.sh* script.

Configuration Files	**Description**
PiService Configurations	***/Config/PiServiceConfigFiles directory***
SSHPDataTransfer.xml	Defines data to be exported for SSHP Data Transfer
Region Configurations	***/Config/RegionConfigFiles directory***
ModuleInstanceSets	Defines a set of SAC modules used by SSHP Data Transfer
LocationSets	Defines a set of locations used by SSHP Data Transfer
Id Map Configurations	***/Config/IdMapFiles directory***
IdExportPiService.xml; and IdImportPiService.xml	A pair of files that describe mappings for importing and exporting when using SSHP Data Transfer

/Config/PiServiceConfigFiles/SSHPDataTransfer.xml. See Pi service control file format below.

```
<?xml version="1.0" encoding="UTF-8"?>
<fewsPiServiceConfig xmlns="http://www.wldelft.nl/fews"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.wldelft.nl/fews
http://fews.wldelft.nl/schemas/version1.0/fewsPiServiceConfig.xsd">
      <general>
            <importIdMap>IdImportPiService</importIdMap>
            <exportIdMap>IdExportPiService</exportIdMap>
                  <timeZone>
                      <timeZoneOffset>-05:00</timeZoneOffset>
                  </timeZone>
      </general>

      <timeSeries>
            <id>TimeSeries</id>
            <timeSeriesSet>
                  <moduleInstanceSetId>SSHP_SACSMA</moduleInstanceSetId>
                  <valueType>scalar</valueType>
                  <parameterId>INFW</parameterId>
                  <locationSetId>SSHP</locationSetId>
                  <timeSeriesType>simulated forecasting</timeSeriesType>
                  <timeStep unit="hour" multiplier="6" />
                  <readWriteMode>read only</readWriteMode>
            </timeSeriesSet>
            <missingValue>-999.0</missingValue>
      </timeSeries>

      <moduleParameterSet>
         <id>UNITHG_ABBI3_ABBI3</id>

<moduleInstanceId>UNITHG_ABBI3_ABBI3_UpdateStates</moduleInstanceId>
      </moduleParameterSet>

      <moduleParameterSet>
         <id>SACSMA_ABBI3_ABBI3</id>

<moduleInstanceId>SACSMA_ABBI3_ABBI3_UpdateStates</moduleInstanceId>
            </moduleParameterSet>

            <moduleState>
         <id>SACSMA_ABBI3_ABBI3</id>

<moduleInstanceId>SACSMA_ABBI3_ABBI3_UpdateStates</moduleInstanceId>
           </moduleState>
</fewsPiServiceConfig>
```

Element descriptions:

< fewsPiServiceConfig> - mandatory root node

<general> - Contains general configuration, such as import and export locations. Id mapping information for mapping client location/parameter ids to FEWS location/parameter ids.

<timeSeries> - Contains the mapping of client timeseries ids to the FEWS timeseries sets.

<moduleParameterSet> - Contains the mapping of client moduleParameterSet ids to the FEWS moduleInstance descriptor ids.

<moduleState> - Contains the mapping of client moduleState ids to the FEWS moduleInstance descriptor ids.

6. FEWS Adapter Used

N/A

7. Common Issues

Issues	Possible causes
SshpDataTransferMgrCHPS.log (in /awips/hydroapps/whfs/local/data/log/sshp)	
ERROR- /awips/hydroapps/whfs/local/data/sshp_transfer/ofs_extract_text/CRWI3_CRWI3.2011_02_09_18_51_57.txt *not found*.	See the ofs extract text log file (in XML format) for more details.
WARNING- Could not get the correct moduleInstanceId "ARCT2" in the control file. Skip this forecast point....	Check the moduleInstanceId in the control file SSHPCHPSTransfer.xml
SshpDataTransferMgr.stdoutCHPS.log (in /awips/hydroapps/whfs/local/data/log/sshp)	
ERROR- the 'running' file does not exist.	Need to run the backend pi service
ERROR- Could not connect to PiService because running file is too old '< 1 minute'	Need to restart the backend pi service
ofs extract text log (in /awips/hydroapps/whfs/local/data/sshp_transfer/ofs_extract_text)	
ERROR- WebService connection refused. Please check the PiServicePort.	The PiServicePort property in the pi service global properties file should be set to the same number.
ERROR- SSHP could not retrieve PARAMETER from database	Check moduleParameterSet id in PiServiceConfigFile.
ERROR- SSHP could not retrieve TIMESERIES from database	Check timeSeries Id in PiServiceConfigFile.
ERROR- SSHP could not retrieve Model STATE from database	Check moduleState id in PiServiceConfigFile.

8. Instructions to add a new location to the existing FEWS SSHP configuration

1. Add new location to FEWS configuration xml files
   a. Add a new location into ***Config/PiServiceConfigFiles/ SSHPDataTransfer.xml***
   Append moduleParameterSet for UNITHG and SACSMA after the element tag </timeSeries>

   Example:
   …
   </timeSeries>
   <moduleParameterSet>
   <id>UNITHG_**PHAO1_PHAO1**</id>
   <moduleInstanceId>UNITHG_**PHAO1_PHAO1**_UpdateStates</moduleInstanceId>
   </moduleParameterSet>
   <moduleParameterSet>
   <id>SACSMA_**PHAO1_PHAO1**</id>
   <moduleInstanceId>SACSMA_**PHAO1_PHAO1**_UpdateStates</moduleInstanceId>
   ….

   - Append moduleState for SACSMA before the element tag </fewsPiServiceConfig>

   Example:
   ….
   <moduleState>
   <id>SACSMA_**PHAO1_PHAO1**</id>
   <moduleInstanceId>SACSMA_**PHAO1_PHAO1**_UpdateStates</moduleInstanceId>
   </moduleState>
   </fewsPiServiceConfig>

   b. Add a new locationId to **locationSet id**="SSHP" under ***Config/RegionConfigFiles/ LocationSets.xml*** file
   Example:
   <locationSet id="SSHP">
   <locationId>PHAO1</locationId>
   ….
   </locationSet>

   c. Add a new moduleInstanceId to **moduleInstanceSet id**="SSHP_SACSMA" under ***Config/RegionConfigFiles/ ModuleInstanceSets.xml*** file
   Example:
   <moduleInstanceSet id="SSHP_SACSMA">
   <moduleInstanceId>SACSMA_**PHAO1_PHAO1**_Forecast</moduleInstanceId>
   …
   </moduleInstanceSet>

2. Add new wfo focus points to AWIPS configuration xml file
   a. Open ***/awips/hydroapps/whfs/local/data/app/sshp/SSHPCHPSTransfer.xml***
   b. Edit a new element <fcstPoint> that represents the information used to pull data out of OFS and send it with the correct information to the WFO. It contains the sub-elements: < moduleInstanceId>, <ihfsLocId>, <ihfsBasinId>, <sendMapeTimeseries>.

   Example:
   <fcstPoint>
   <moduleInstanceId>**PHAO1_PHAO1**</moduleInstanceId>
   <ihfsLocId>PHAO1</ihfsLocId>
   <ihfsBasinId>PHAO1</ihfsBasinId>
   <sendMapeTimeseries>NO</sendMapeTimeseries>
   </fcstPoint>>