

Denver EMWIN Technical Training Session

September, 2007



Agenda

	<u>TOPIC</u>	<u>TIME</u>
I.	Introductions	0900 – 0910
II.	EMWIN System overview	0910 – 0930
III.	EMWIN “weather product” terminology	0930 – 1000
IV.	User’s EMWIN receiver system	1000 – 1030
	MORNING BREAK	1030 -1045
IV.	User’s EMWIN receiver system – cont’d	1045 – 1200
	LUNCH BREAK	1200 - 1300



Agenda - continued

	<u>TOPIC</u>	<u>TIME</u>
V.	EMWIN Rebroadcast Hardware	1300 – 1330
VI.	EMWIN Rebroadcast Software	1330 – 1430
VII.	EMWIN alerts	1430 – 1500
VIII.	BREAK	1500-1515
IX.	EMWIN web page	1515-1530
X.	Remote access to computers Hands on time with EMWIN Denver system	1530 - 1600



I. Introductions



II. EMWIN System Overview





What is EMWIN?

- The Emergency Managers Weather Information Network is a wireless, priority-driven computer weather data broadcast system that takes advantage of minimal wireless bandwidth.
- EMWIN provides rapid Satellite, VHF Radio, and Internet dissemination of:
 - Alerts / Warnings < 1 minute
 - Forecasts ~ 2-5 minutes
 - Graphics ~ 10-15 minutes
 - Imagery ~ 10-15 minutes
 - Other (as time permits)



Borrowed from Santos Rodriguez
"EMWIN overview 042704"
- with permission



How it works

Data are collected from a variety of sources:

1. Gateway
2. Weather Wire
3. FTP
4. Internet

They are assembled at the EMWIN servers and:

1. Prioritized into high/mid/low priority products
2. Split into 1k packets
3. Assembled into a 9.6kbs serial datastream

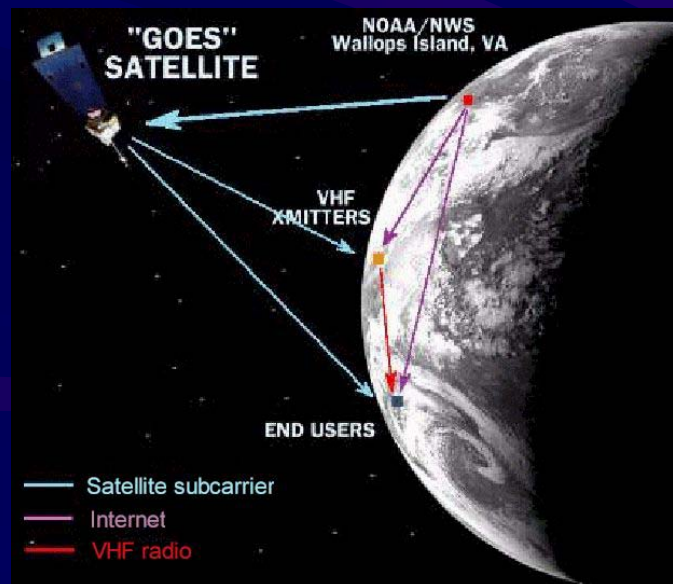


Borrowed from Santos Rodriguez
"EMWIN overview 042704"
- with permission



How it works cont.

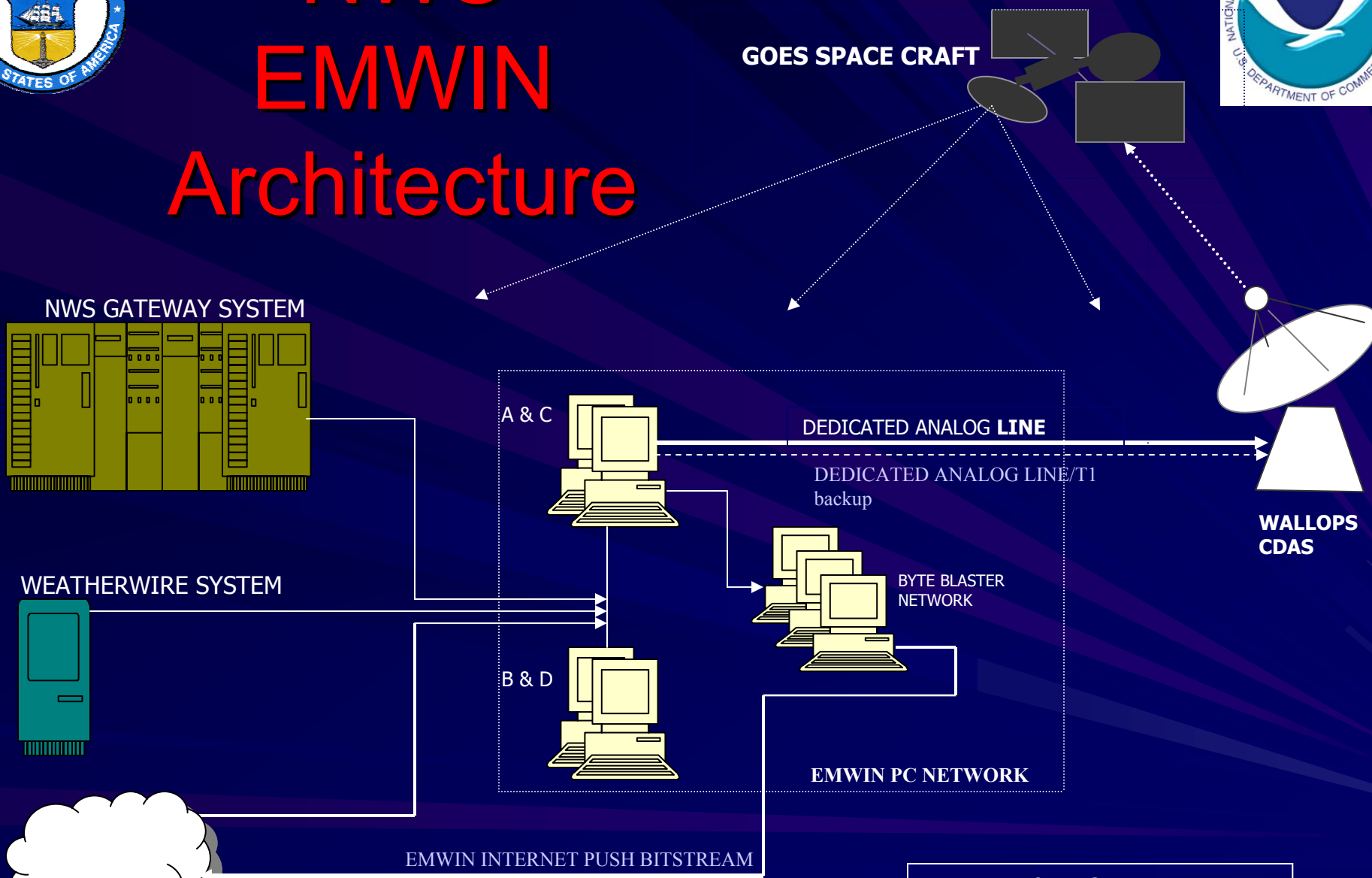
- The data stream is then sent to Wallops Command and Data Acquisition Station (WCDAS), NESDIS where it is up-linked to satellites (GOES 12 and GOES 10 [now 11]_{rgb})



Borrowed from Santos Rodriguez
"EMWIN overview 042704"
With permission



NWS EMWIN Architecture



SOURCES

Borrowed from Santos Rodriguez
"EMWIN overview 042704"
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History of EMWIN

- Began in 1994 in Washington D.C. as an outreach project
- Converted NWR transmitter placed on top of NWSH
- NWS produced software and data
- Commercial vendors produced radios/demodulators
- PBS in D.C. began to uplink EMWIN data on Telstar401



Borrowed from Jim Purpura NWS training materials 12/11/2000
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History of EMWIN

- Summer 1995 – NWS worked with Oklahoma Regents to provide data to state network
- Data downlinked from PBS connected to Regents state fiber network
- Data on phone line from OU to NWS OUN
- Late November 1995 – OUN becomes 1st location outside of NWSH to rebroadcast
 - 46.925 now 169.025
- Tulsa quickly becomes 2nd site within about a month



Borrowed from Jim Purpura NWS training materials 12/11/2000
– with permission

History of EMWIN

- April 1996 – Frequencies obtained from National Guard for rebroadcast
- April 1996 – OKC Site added 150.750
- Downlink signal added at 1200 Baud to GOES 8 and GOES 9
- Spring 1996 – Home downlinks become available in the \$1200 - \$1500 range
 - Allowed rebroadcasting especially in Oklahoma where frequencies were available
- Spring 1996 – Zephyrus Electronics adds signal to Galaxy 4 satellite
 - Same satellite as DTN data



EMWIN Coverage as of 11/98

State of Oklahoma



Area of Coverage
is "approximate"



Borrowed from Jim Purpura NWS training materials 12/11/2000
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History of EMWIN

- 1997 – Problems were seen with bandwidth – too many products requested
 - 1200 Baud could no longer support large numbers of customers in a timely manner outside of DC and Texas/Oklahoma
- September 1997 – To solve the bandwidth dilemma, downlink speed increased to 9600 Baud on GOES 8/9



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History of EMWIN

■ Current constellation status:

- GOES East: GOES 12 (75 W)
- GOES West: GOES 11 (135W)
- Caribbean satellite: GOES 10 (60W)
- Pacific satellite: GOES 7 (175W +/- 3)
(operated by PEACESAT)

■ NOAA is upgrading EMWIN data stream to 19.2 kbps with next generation satellites

- Primary goal to conform to ITU power limits
- Requires new receiver hardware
- “Sometime before 2011” per NOAA documentation
- Current plan calls for replacing GOES West first



III. Weather data



Weather data terminology

EMWIN “products” are categorized by formats:

TEXT (.TXT)
GRAPHICS (.GIF, .JPG)
Compressed (.ZIS)

Product identifier format is XXXYYYZZ.AAA

Where: XXX is the product identifier (TOR)
 YYY is the originating NWS office (BOU)
 ZZ is the state / marine zone abbreviation (CO)
 AAA is the format identifier (.txt,.gif, etc.)

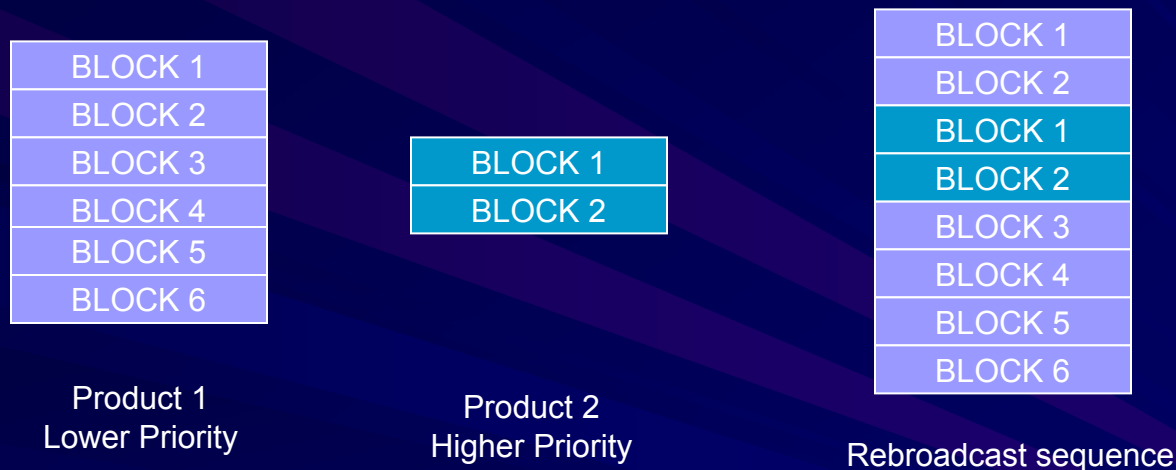
For example, a tornado warning issued from the Denver WFO would be

TORBOUCO.TXT



Weather data terminology

- EMWIN products are structured in blocks of 1000 bytes. Multi-block products can be “broken apart” and sent over time, to be re-assembled at the receiving end. This allows higher priority products to be delivered with minimal delay.



- Products are prioritized for dissemination at the NWS office in Silver Springs, MD. Severe weather products take precedence.



Weather data

- **Graphic content is limited due to bandwidth constraints.**
 - Graphics products may be delayed or dropped during severe weather events

NOTE: Local radar images are NOT available on EMWIN satellite or internet streams



Weather product terminology

SAMPLE TEXT WEATHER PRODUCT

WFUS54 KBMX 192255

TORBHM

ALC113-192330-

BULLETIN - EAS ACTIVATION REQUESTED

TORNADO WARNING

NATIONAL WEATHER SERVICE BIRMINGHAM AL

455 PM CST WED MAR 19 2003

THE NATIONAL WEATHER SERVICE IN BIRMINGHAM HAS ISSUED A

* TORNADO WARNING FOR...

RUSSELL COUNTY IN SOUTHEAST ALABAMA

* UNTIL 530 PM CST

* AT 455 PM CST...NATIONAL WEATHER SERVICE DOPPLER RADAR INDICATED A TORNADO NEAR FORT MITCHELL...MOVING NORTHEAST AT 25 MPH. THIS STORM WILL AFFECT RURAL EASTERN RUSSELL COUNTY.

IF YOU ARE NEAR THE PATH OF THIS TORNADO...TAKE COVER IN AN INTERIOR ROOM ON THE LOWEST FLOOR...OR A BASEMENT. ABANDON MOBILE HOMES AND VEHICLES FOR MORE SUBSTANTIAL SHELTER.

CALL 1-800-856-0758 TO REPORT SEVERE WEATHER.

LAT...LON 3229 8514 3213 8504 3226 8492 3247 8499



Weather product terminology

WFUS54 KBMX 192255

TORBHM

ALC113-192330-

<<< WMO header and Issued time of product

<<<< Product Identifier, WFO identifier

<<<< UGC code – Expiration time of product

BULLETIN - EAS ACTIVATION REQUESTED
TORNADO WARNING
NATIONAL WEATHER SERVICE BIRMINGHAM AL
455 PM CST WED MAR 19 2003

<<< Header

THE NATIONAL WEATHER SERVICE IN BIRMINGHAM HAS ISSUED A
* TORNADO WARNING FOR...
RUSSELL COUNTY IN SOUTHEAST ALABAMA
* UNTIL 530 PM CST
* AT 455 PM CST...NATIONAL WEATHER SERVICE DOPPLER RADAR INDICATED A
TORNADO NEAR FORT MITCHELL...MOVING NORTHEAST AT 25 MPH. THIS STORM
WILL AFFECT RURAL EASTERN RUSSELL COUNTY.
IF YOU ARE NEAR THE PATH OF THIS TORNADO...TAKE COVER IN AN INTERIOR
ROOM ON THE LOWEST FLOOR...OR A BASEMENT. ABANDON MOBILE HOMES AND
VEHICLES FOR MORE SUBSTANTIAL SHELTER.
CALL 1-800-856-0758 TO REPORT SEVERE WEATHER.

LAT...LON 3229 8514 3213 8504 3226 8492 3247 8499

<<< LAT LON coordinates
(DDMM [LAT] DDMM [LON] for
each apex of the warning polygon)

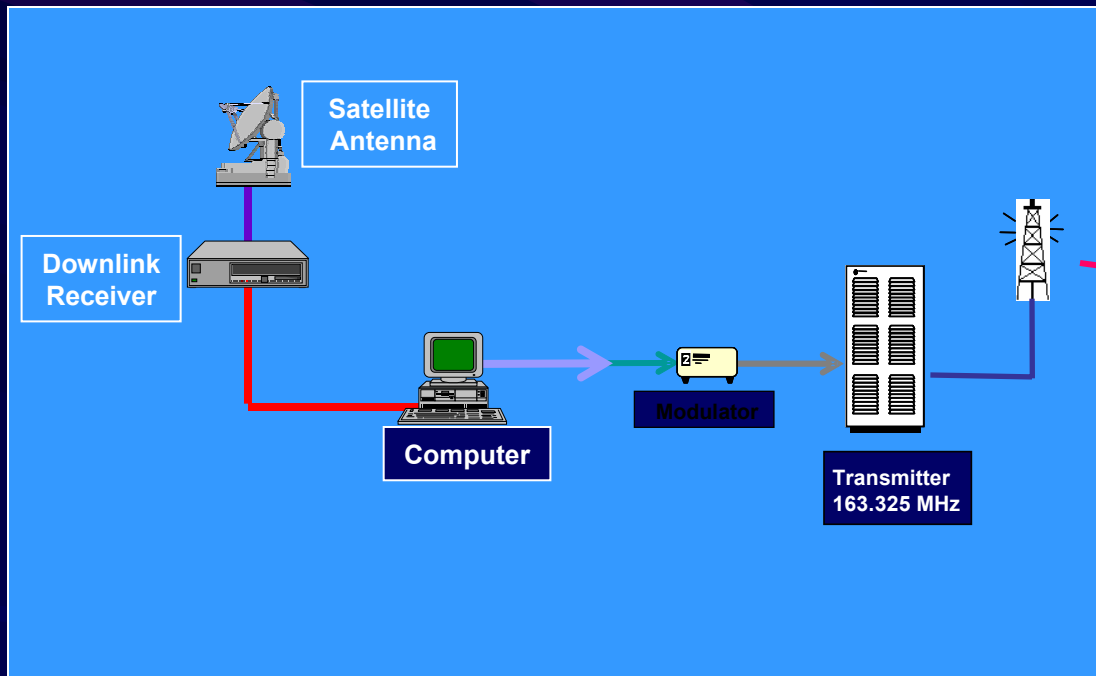


V. EMWIN Denver System Diagrams

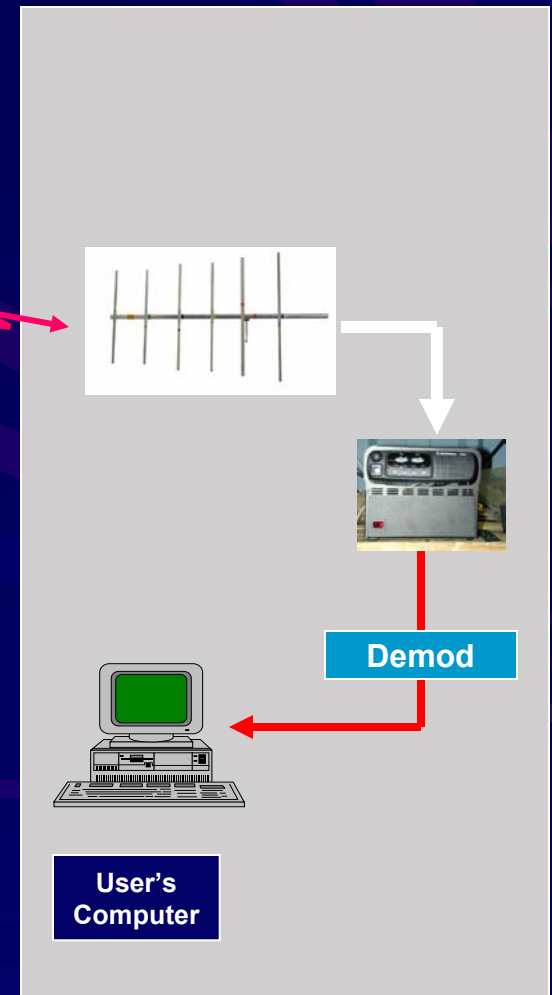


Simplified EMWIN Denver Rebroadcast System Diagram

Adams County



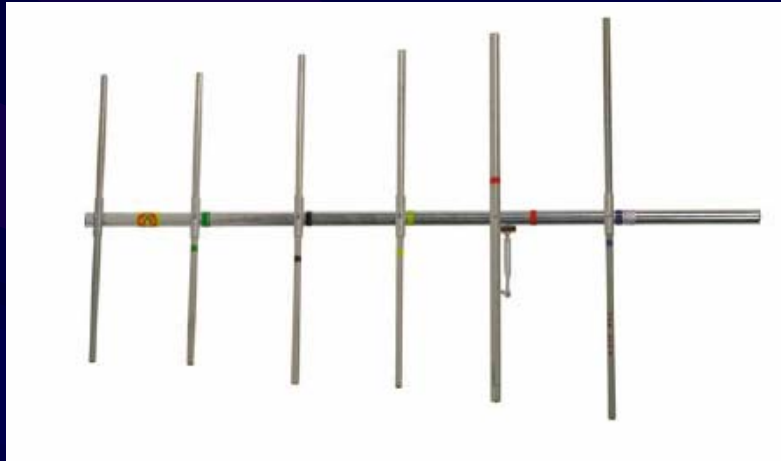
Remote Receiver sites



IV. EMWIN end user Receiver Equipment



III. EMWIN receiver system



Demodulator



163.325 MHz receiver



Features of EMWIN rebroadcast feed from Adams County

- Prioritized local content
 - Watches, warnings, Homeland Security messages
 - Hazardous Weather Outlook
 - Amber alerts
 - Forecasts, current conditions
- Satellite-based imaging
- Hurricane tracks
- Local radar
- Internet feed also available
- Email alerts for local severe weather
- Coming Soon: Message insertion tool for EM's



RealEMWIN

- General purpose interface
 - Text based
 - Simple, easy to use
- Target Audience
 - Emergency Managers
 - Amateur weather spotters
 - Meteorologists
- Most popular software package



RealEMWIN

The screenshot displays the RealEMWIN V1.7 software interface. The title bar reads "RealEMWIN V1.7 - Professional Version - Custom software from Skywarn Systems Inc." and the address bar shows "192.168.1.53:1". The menu bar includes "File", "Quick", "Bulletins", "Add-ins", "Edit", and "Help". The main interface features several tabs: "Radar", "Forecast", "Haz Outlook" (selected), "Short Tm", "Watches", "Fire Wthr", "Flash Fld", "Winter", and "Hourly". Below these are buttons for "Live", "Filter", "Log", "WFO", "REQUEST", and a status bar displaying "Received RWRNY from KBLF".

The main display area shows a list of state and river weather roundups on the left and a detailed hazardous weather outlook on the right. The outlook text is as follows:

```
PLUS45 KBOU 091154
HWOBOU

HAZARDOUS WEATHER OUTLOOK
NATIONAL WEATHER SERVICE DENVER CO
554 AM MDT THU SEP 09 2004

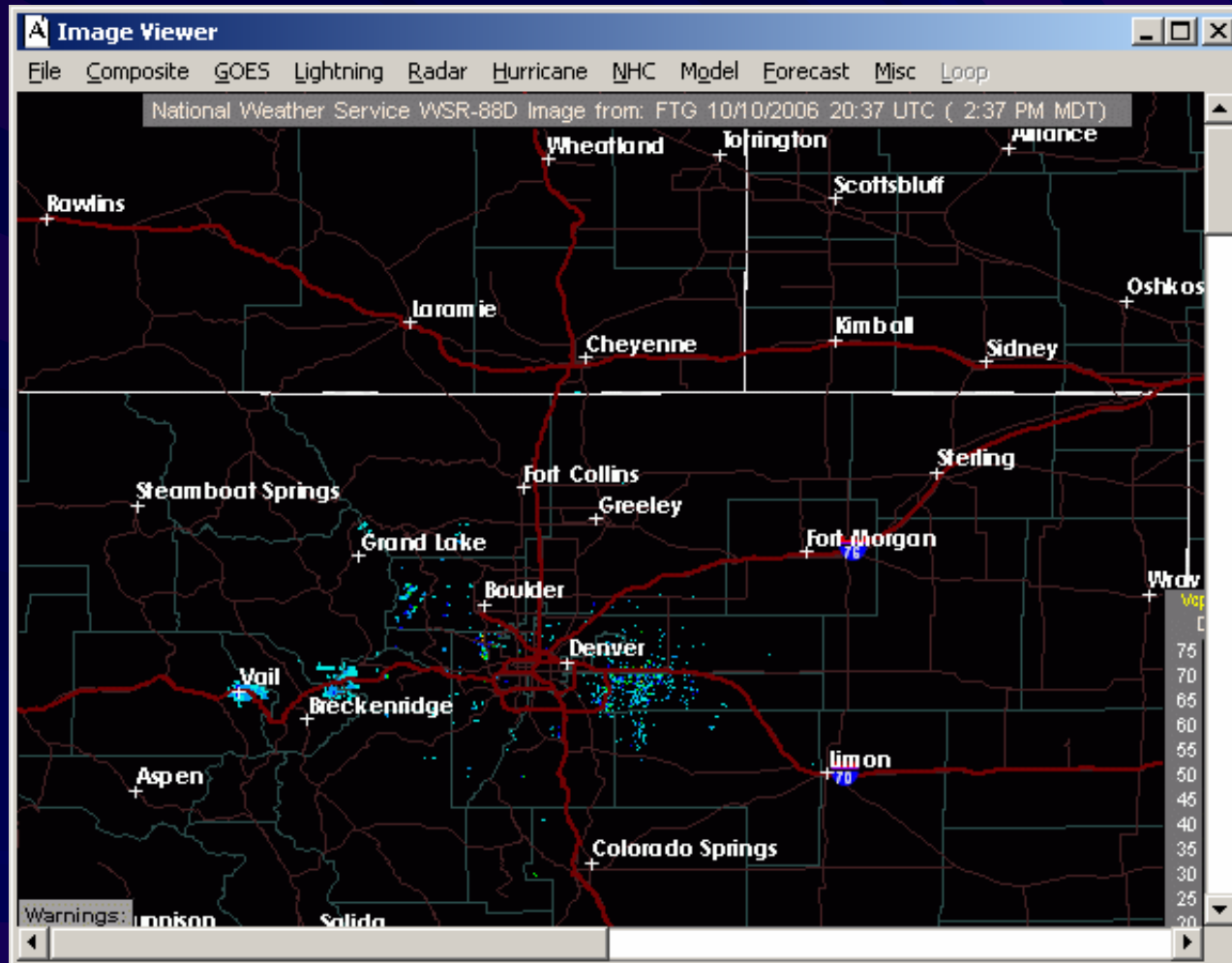
COZ030>051-091700-
JACKSON COUNTY BELOW 9000 FEET-WEST JACKSON AND WEST GRAND
COUNTIES ABOVE 9000 FEET-GRAND AND SUMMIT COUNTIES BELOW 9000
FEET-SOUTH AND EAST JACKSON/LARIMER/NORTH AND NORTHEAST GRAND/
NORTHWEST BOULDER COUNTIES ABOVE 9000 FEET-SOUTH AND SOUTHEAST
GRAND/WEST CENTRAL AND SOUTHWEST BOULDER/GILPIN/CLEAR CREEK/
SUMMIT/NORTH AND WEST PARK COUNTIES ABOVE 9000 FEET-LARIMER AND
BOULDER COUNTIES BETWEEN 6000 AND 9000 FEET-JEFFERSON AND WEST
DOUGLAS COUNTIES ABOVE 6000 FEET/GILPIN/CLEAR CREEK/NORTHEAST PARK
COUNTIES BELOW 9000 FEET-CENTRAL AND SOUTHEAST PARK COUNTY-LARIMER
COUNTY BELOW 6000 FEET/NORTHWEST WELD COUNTY-BOULDER AND JEFFERSON
COUNTIES BELOW 6000 FEET/WEST BROOMFIELD COUNTY-NORTH DOUGLAS
COUNTY BELOW 6000 FEET/DENVER/WEST ADAMS AND ARAPAHOE COUNTIES/
EAST BROOMFIELD COUNTY-ELBERT/CENTRAL AND EAST DOUGLAS COUNTIES
ABOVE 6000 FEET-NORTHEAST WELD COUNTY-CENTRAL AND SOUTH WELD
COUNTY-MORGAN COUNTY-CENTRAL AND EAST ADAMS AND ARAPAHOE COUNTIES-
NORTH AND NORTHEAST ELBERT COUNTY BELOW 6000 FEET/NORTH LINCOLN
COUNTY-SOUTHEAST ELBERT COUNTY BELOW 6000 FEET/SOUTH LINCOLN
COUNTY-LOGAN COUNTY-WASHINGTON COUNTY-SEDGWICK COUNTY-PHILLIPS
COUNTY-
554 AM MDT THU SEP 09 2004

THIS HAZARDOUS WEATHER OUTLOOK IS FOR NORTHEAST AND NORTH CENTRAL
COLORADO.
```

The left sidebar lists various weather products such as "NY -State Weather Roundup", "VT -State Weather Roundup", "MA -State Weather Roundup", "CO -State Weather Roundup", "ID -State Weather Roundup", "AL -State Weather Roundup", "ND -State Weather Roundup", "NY -State Weather Roundup", "AKQ-State Weather Roundup", "AK -State Weather Roundup", "NM -State Weather Roundup", "WBC-River Statement", "PQR-River Statement", "HFR-River Statement", "CTP-River Statement", "BGM-River Statement", "FPCN21 -CWTO-MI", "KRF-River Summary", "TLH-Daily River Forecast", "PWN-Daily River Forecast", "MPX-Daily River Forecast", "GSP-Daily River Forecast", "AFG-River Summary", "TLH-River Summary", "MLI-Automated Hydromet", "MKE-River Summary", "WBC-River Summary", "LSE-River Summary", "DSM-River Summary", "BOS-Hydrology Report", "VEF-Temperature and Precip", "STO-Temperature and Precip", "SJT-Temperature and Precip", "REV-Temperature and Precip", "PUB-Temperature and Precip", "PIH-Temperature and Precip", "OTX-Temperature and Precip", "HFR-Temperature and Precip", and "WR -Temperature and Precip".

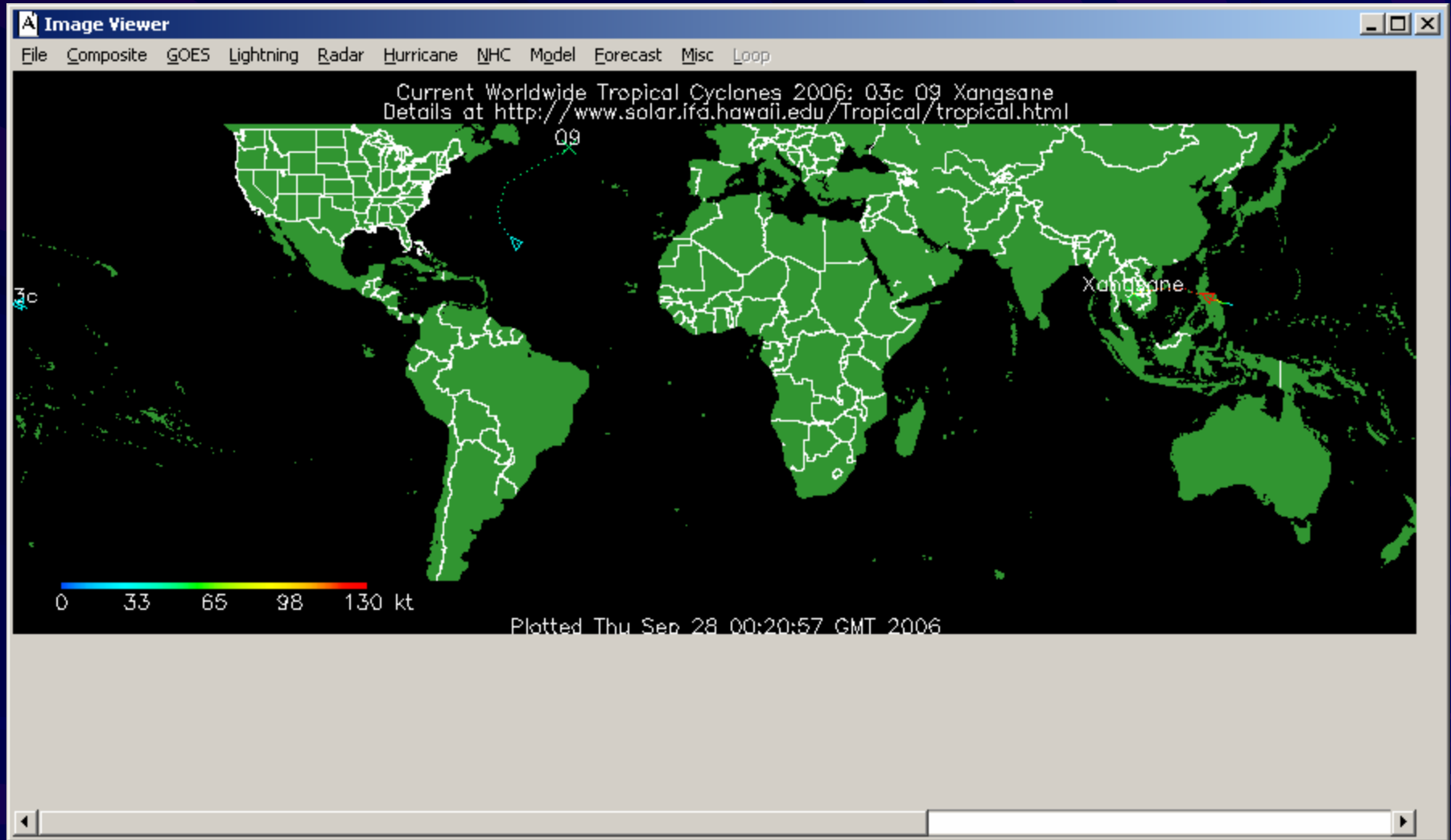
The Windows taskbar at the bottom shows the "start" button, several application icons, and the system clock displaying "5:01 PM" on "Thursday".

RealEMWIN Graphics



Radar loop

RealEMWIN Graphics



Tropical Cyclone
Track

RealEMWIN

- Customizable alerting interface
 - Audible and visible alerts on-screen
 - log alert history to a file
 - send email



Weather product terminology

EMWIN products names are structured in a specific way.

The product identifier format is **XXXYYYZZ.AAA**

Where:

XXX	is the product identifier	(TOR)
YYY	is the originating NWS office	(BOU)
ZZ	is the state / marine zone abbreviation	(CO)
AAA	is the format identifier (.txt,.gif, etc.)	

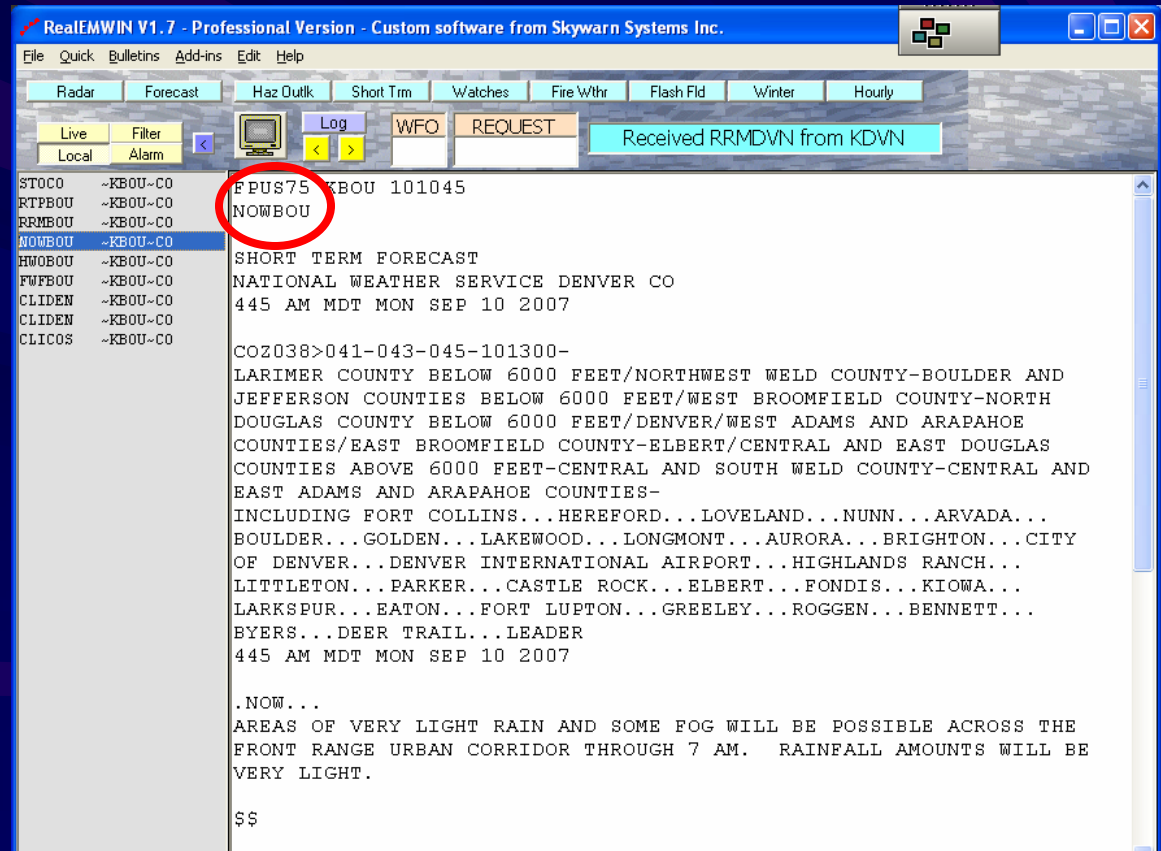
For example, a tornado warning issued from the Boulder WFO would be

TORBOUCO.TXT



Weather product terminology

- You will need the first six characters of the desired product to set an alarm
 - For our purposes, all products are of the form: **XXXBOU**



The screenshot shows the RealEMWIN V1.7 software interface. The window title is "RealEMWIN V1.7 - Professional Version - Custom software from Skywarn Systems Inc.". The interface includes a menu bar (File, Quick, Bulletins, Add-ins, Edit, Help) and a toolbar with buttons for Radar, Forecast, Haz Outlk, Short Tm, Watches, Fire Wthr, Flash Fld, Winter, and Hourly. Below the toolbar, there are buttons for Live, Filter, Log, WFO, and REQUEST. A status bar at the top right displays "Received RRMDVN from KDVN".

The main display area is divided into two panes. The left pane shows a list of weather products with their corresponding station identifiers (all starting with ~KBOU-CO):

- STOCO ~KBOU-CO
- RTPBOU ~KBOU-CO
- RRMBOU ~KBOU-CO
- NOWBOU ~KBOU-CO** (highlighted with a red circle and a red arrow pointing to it)
- HWOBOU ~KBOU-CO
- FWFBOU ~KBOU-CO
- CLIDEN ~KBOU-CO
- CLIDEN ~KBOU-CO
- CLICOS ~KBOU-CO

The right pane displays the forecast for the selected product, NOWBOU. The forecast text is as follows:

```
FPUS75 KBOU 101045
NOWBOU
SHORT TERM FORECAST
NATIONAL WEATHER SERVICE DENVER CO
445 AM MDT MON SEP 10 2007

COZ038>041-043-045-101300-
LARIMER COUNTY BELOW 6000 FEET/NORTHWEST WELD COUNTY-BOULDER AND
JEFFERSON COUNTIES BELOW 6000 FEET/WEST BROOMFIELD COUNTY-NORTH
DOUGLAS COUNTY BELOW 6000 FEET/DENVER/WEST ADAMS AND ARAPAHOE
COUNTIES/EAST BROOMFIELD COUNTY-ELBERT/CENTRAL AND EAST DOUGLAS
COUNTIES ABOVE 6000 FEET-CENTRAL AND SOUTH WELD COUNTY-CENTRAL AND
EAST ADAMS AND ARAPAHOE COUNTIES-
INCLUDING FORT COLLINS...HEREFORD...LOVELAND...NUNN...ARVADA...
BOULDER...GOLDEN...LAKEWOOD...LONGMONT...AURORA...BRIGHTON...CITY
OF DENVER...DENVER INTERNATIONAL AIRPORT...HIGHLANDS RANCH...
LITTLETON...PARKER...CASTLE ROCK...ELBERT...FONDIS...KIOWA...
LARKSPUR...EATON...FORT LUPTON...GREELEY...ROGGEN...BENNETT...
BYERS...DEER TRAIL...LEADER
445 AM MDT MON SEP 10 2007

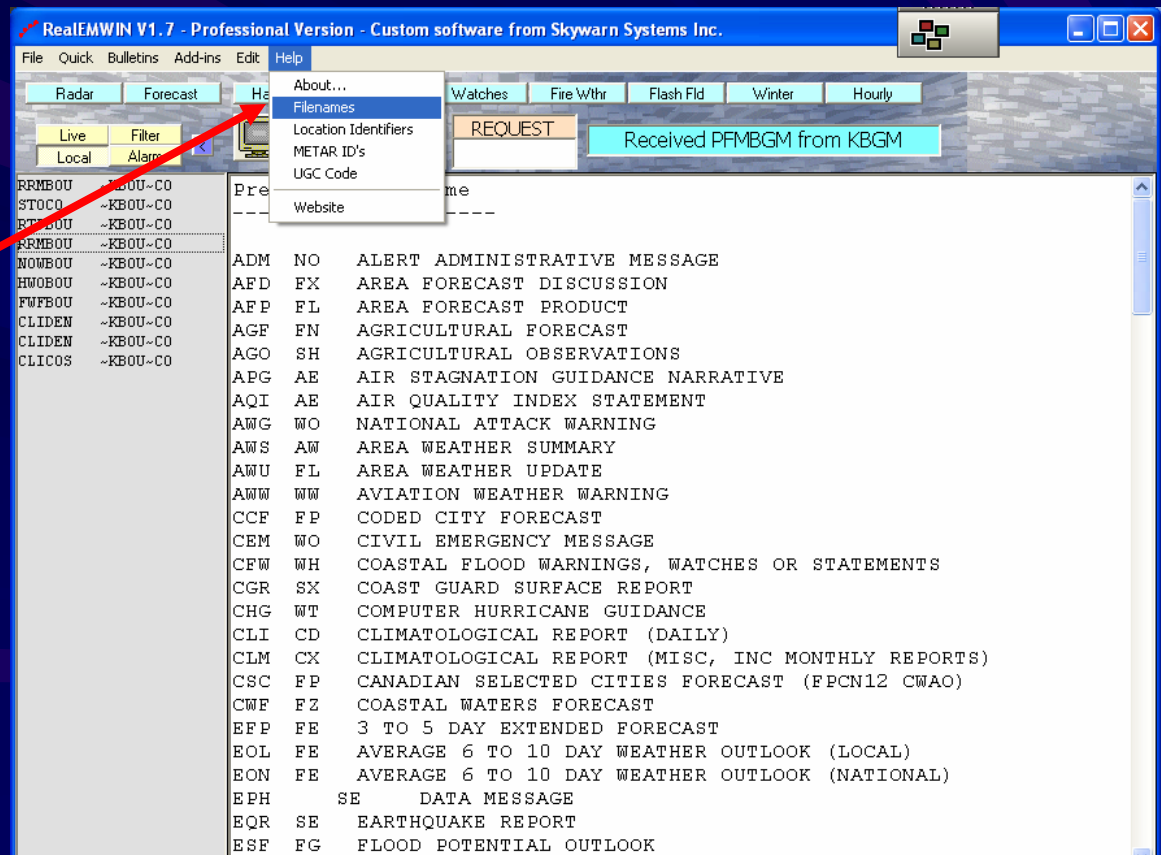
.NOW...
AREAS OF VERY LIGHT RAIN AND SOME FOG WILL BE POSSIBLE ACROSS THE
FRONT RANGE URBAN CORRIDOR THROUGH 7 AM. RAINFALL AMOUNTS WILL BE
VERY LIGHT.

$$
```



Weather product terminology

- A list of products is available through the “Help”...”Filenames” menu...



RE Alarm Menu

The screenshot displays the 'EMWIN Alarms' window. It features a table with columns for PRODUCT, Zone, Prnt, Dis, Scr, Audio, E-mail, Pager, EXE, Time, Log, Lst, Cmp, and Cus. Below the table are various controls including dropdown menus for Product, State, County, EMail, Alert, and EXE, along with checkboxes for Print, Display, Custom, Scroll, Compress, Log, and List. At the bottom, there are buttons for 'Sort by Prod', 'Sort by Zone', and an 'Alarm File' section with radio buttons for File 1 through File 5. A green 'Add' button and a red 'Exit' button are also present. On the right side of the window, there are two vertical sliders and a 'Time Range' label with the values 7 and 22, and a 'Time' checkbox.

PRODUCT	Zone	Prnt	Dis	Scr	Audio	E-mail	Pager	EXE	Time	Log	Lst	Cmp	Cus
FFWBOU	COC001	No	No	Yes	None	None	None	0	All	No	No	No	No
WSWBOU	COZ040	No	No	Yes	None	None	None	0	All	No	No	No	No
NPWBOU	COZ040	No	No	Yes	None	None	None	0	All	No	No	No	No
SVRBOU	COC001	No	No	Yes	None	None	None	0	All	No	No	No	No
SLS?	COC000	No	No	Yes	None	None	None	0	All	No	No	No	No
TORBOU	COC001	No	No	Yes	Alert1	None	None	0	All	Yes	No	No	No

A wide range of alerting capabilities built into RealEMWIN



Customizing RealEMWIN

EMWIN Alarms

PRODUCT	Zone	Prnt	Dis	Scr	Audio	E-mail	Pager	EXE	Time	Log	Lst	Cmp	Cus
FFWBOU	COC001	No	No	Yes	None	None	None	0	All	No	No	No	No
WSWBOU	COZ040	No	No	Yes	None	None	None	0	All	No	No	No	No
NPWBOU	COZ040	No	No	Yes	None	None	None	0	All	No	No	No	No
SVRBOU	COC001	No	No	Yes	None	None	None	0	All	No	No	No	No
SLS?	COC000	No	No	Yes	None	None	None	0	All	No	No	No	No

7 22
Time Range
Time

Product: TORBOU State: CO
 Print Display Custom Scroll Compress Log List
 Adams Email: None Alert: Alert1 Pager: EXE
 Alarm File: File 1 File 2 File 3 File 4 File 5
 Add Exit

Alarm Set up for Tornado Warning – Adams County



RE Alarm Menu

PRODUCT	Zone	Prnt	Dis	Scr	Audio	E-mail	Pager	EXE	Time	Log	Lst	Cmp	Cus
FFWBOU	COC001	No	No	Yes	None	None	None	0	All	No	No	No	No
WSWBOU	COZ040	No	No	Yes	None	None	None	0	All	No	No	No	No
NPWBOU	COZ040	No	No	Yes	None	None	None	0	All	No	No	No	No
SVRBOU	COC001	No	No	Yes	None	None	None	0	All	No	No	No	No
SLS?	COC000	No	No	Yes	None	None	None	0	All	No	No	No	No

Product: TORBOU State: CO County: Adams
Email: None Alert: Alert1 EXE: -
Print [] Display [] Custom [] Scroll [x] Compress [] Log [x] List []
File 2 File 3 File 4 File 5 Add Exit

NOTE: Be sure to select "Add" before leaving this screen otherwise the alarm is LOST



RealEMWIN Alerts and Alarms

RealEMWIN V1.7 - Professional Version - Custom software from Skywarn Systems Inc.

File Quick Bulletins Add-ins Edit Help

Radar Forecast Haz Outlk Short Trm Watches Fire Wthr Flash Fld Winter Hourly

Live Filter Log WFO REQUEST Unzipped Successfully
Local Alarm

RRMDVN	~KDVN~IA	TEST TEST TEST TEST
OMRILM	~KILM~NC	
SXMN20	~KWAL~NI	This is a TEST WARNING MESSAGE for the RealeMWIN alarm interface
CUFHGX	~KHGX~TX	
IMGWVAUS-09042122.GI:		
SXMN20	~KWAL~NI	
SXMS40	~KWAL~NI	Test test test test
IMGFNT12-09042121.GI:		
SXMS40	~KWAL~NI	
SXMG40	~KWAL~MG	
SXPA50	~KWAL~US	
TESTWARN	~TEST~RN	
FTCA35	~KWBC~US	
FTCA45	~KWBC~US	
SXMN20	~KWAL~NI	
FWSMTR	~KMTR~CA	
IMGFNT06-09042121.GI:		
FWOSGX	~KSGX~CA	
SXMN20	~KWAL~NI	
RRMDVN	~KDVN~IA	
SXPA50	~KWAL~US	
RADDENCO-09042120.GI:		
RADENFTX-09042120.GI:		

DISPLAY selection looks like this

SCROLL selection looks like this

TESTWARN - 9/4/2007 9:21:47 PM

This is a TEST WARNING MESSAGE for

RWRMI	~KMKX~WI	
RADPUXCO-09042120.GI:		
RWRIN	~KMEG~TN	
IMGFNT00-09042120.GI:		
CLIGTF	~KTFX~MT	
AFDFTX	~KTFX~MT	
NOWAFG	~PAFG~AK	

Customizing RealEMWIN

RealEMWIN alarms utility also supports:

Audible alerts

Printing

Executing programs from a DOS shell

Time limits on sending alarms

See RealEMWIN manual (on CD) for additional details on custom user configurations

See also RealEMWIN web site for FAQ's
<http://sky.radioweather.us/realwin.html>



Customizing RealEMWIN

```
RealEMWIN-Button.txt - Notepad
File Edit Format View Help
#Maximum of 9 products
#First characters of the line are used as the caption,
#then ! and any desired filter
#
#Use . and any desired filter for the old EMWIN filenaming
# for example SWRNYCNY. or SWRSATTX.TXZ083
#
 Radar      RADDEN
Forecast    ZFPBOU!COZ040
Haz Outlk   HWOBOU
Short Trm   NOWBOU!COZ040
watches     SELDEN
Fire wthr   FWFDEN!COZ216
Flash Fld   FFWBOU
winter      WSWDEN!COZ040
Hourly      RWRCO!COZ040
```

**This file contains the descriptors and product identifiers
for the buttons across the top of the window
C:\program files\skywatch services\RealEMWIN\RealEMWIN-Button.txt**



BREAK

15 minutes



Hands-On Use

Receiver

Equipment and

Software



QUESTIONS?



LUNCH BREAK

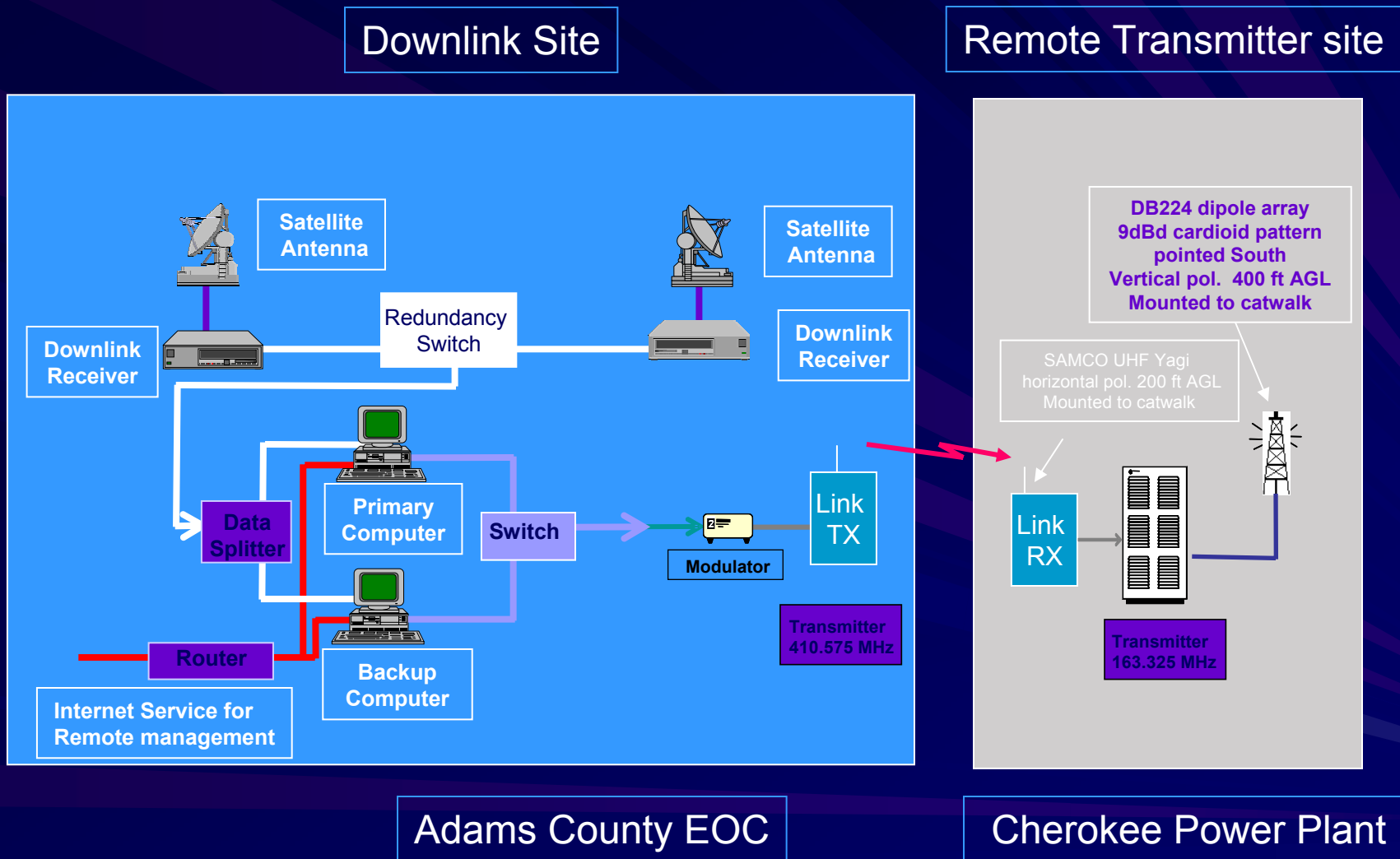
60 minutes



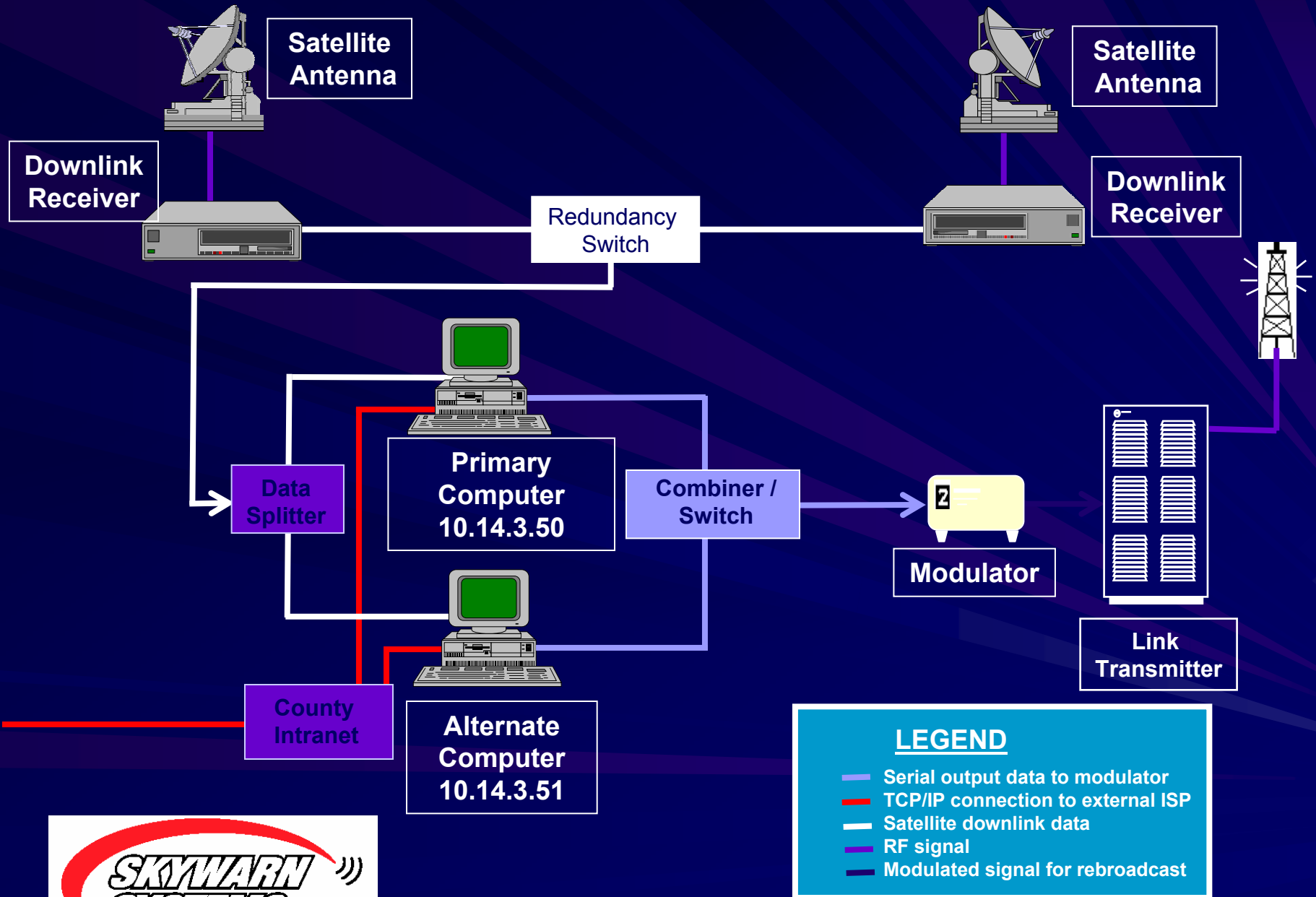
VI. EMWIN Rebroadcast Hardware



Re-Transmission System Link

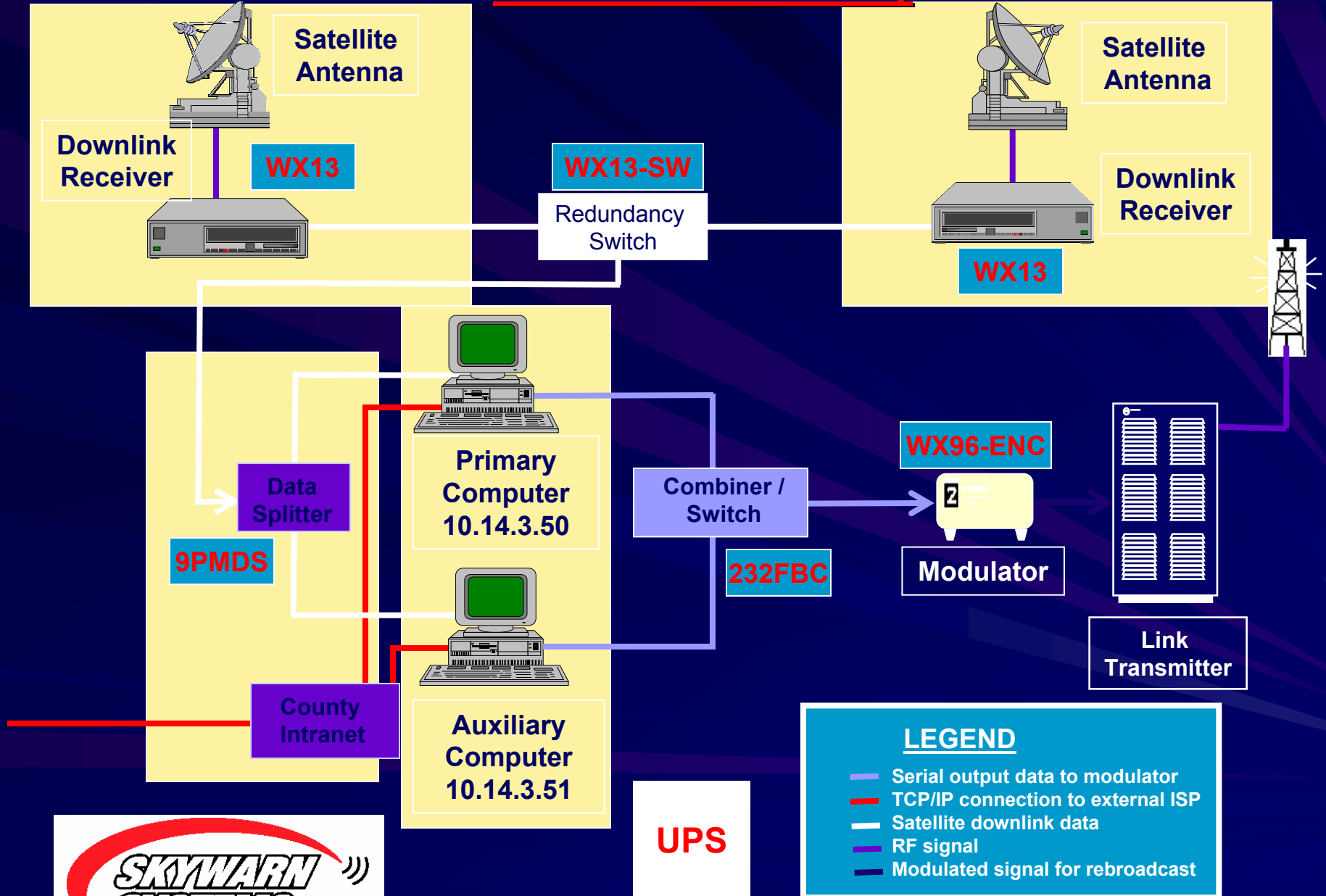


Block Diagram – EMWIN Retransmission System



Block Diagram – EMWIN Retransmission System

Hardware Redundancy



EMWIN Retransmission System Redundancy capabilities / limitations

- ± Satellite receivers auto-switch on failure or loss of signal
- ± Data feed auto-switches to internet backup satellite feed failure or high error threshold (and back)
- ± Data feed to link transmitter auto-switches between primary and aux if one server stops (RTS control)
- ± Auto alerts for data feed loss or switch

+++++

- ± Sat rcvr will not switch on weak signal
- ± Data feed to link TX will not switch on corrupted data
- ± Software does not auto start after power failure
 - ± Software limitations (in part) and conscious decision



Server Redundancy Capabilities / Limitations

- ± Primary server configured for
 - ± Rebroadcast
 - ± All alerts
 - ± Weekly test

- ± Aux server configured for
 - ± Rebroadcast
 - ± Web page interface
 - ± Weekly test

- ± Manual feature transfer can be documented and configured



System hardware -details

- See “system level docs” folder
 - “Adams County Retransmission System”
- See “satellite downlink” folder
- See “Link transmitter” folder

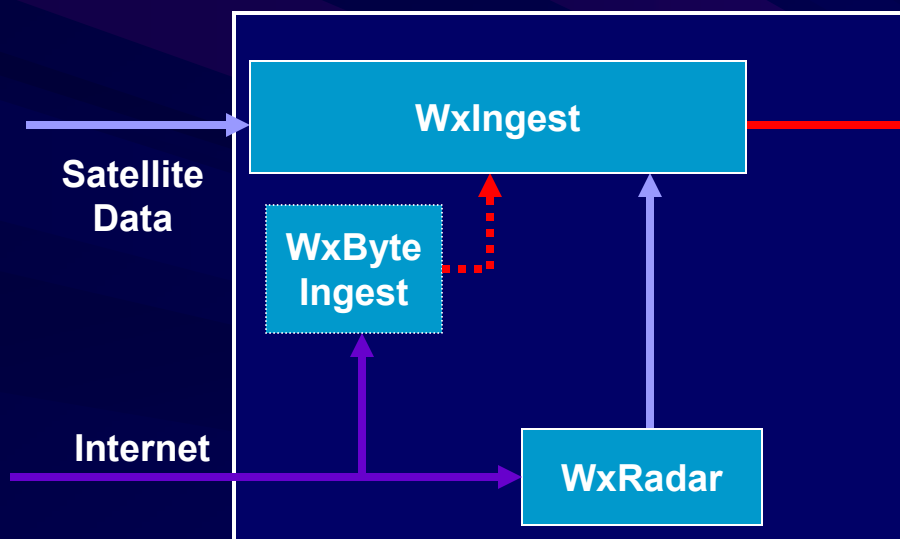


VI. EMWIN Rebroadcast Software

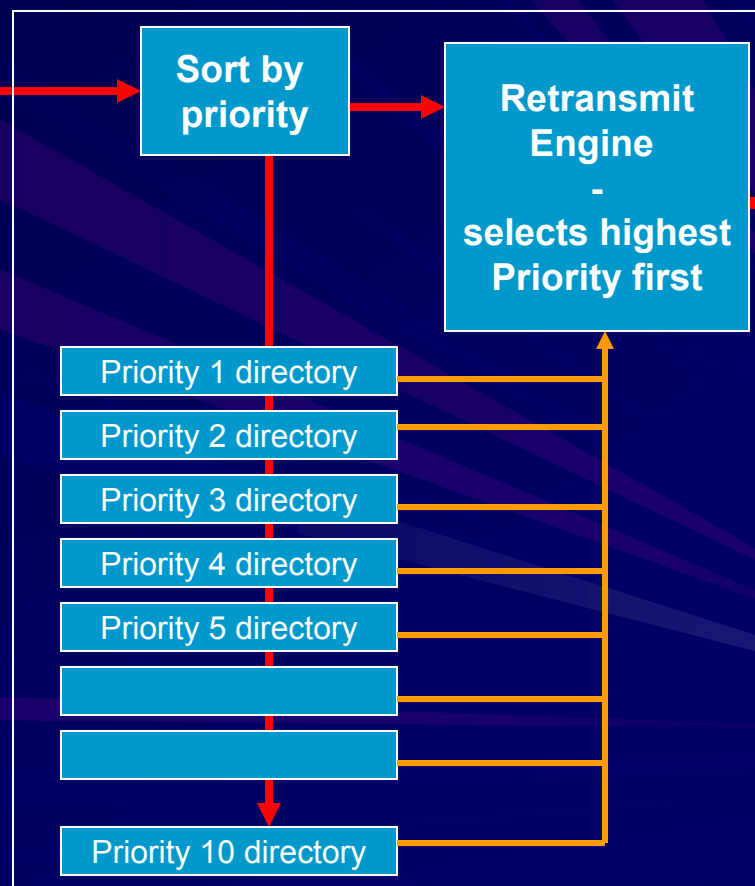


High Level Flow Diagram weather rebroadcast processes

Weather Message Server components




Wx Retransmission



EMWIN Retransmission Engine

EMWIN ReTransmission Engine - By Weather Message

File Help

Sending: Block Of  Files Sent: 8069

Transmitting 9600 BPS Compression Ratio = 1.235:1 Throughput = 11856 BPS

Priority 1	Priority 6
	OMRAPXML.TXT CGREKACA.TXT
Priority 2	Priority 7
Priority 3	Priority 8
	GMS005US.JPG
Priority 4	Sending WNT14US.ZIP: 1 of 1
	WNT14US.ZIP WNT18US.ZIP PFMSGFMO.ZIP
Priority 5	Sending MISDENCO.TXT: 1 of 1
	MISDENCO.TXT



Retransmission Engine Setup

Setup

File

Priority 5 Priority 6 Priority 7 Priority 8 Priority 9 Priority 10
Morse Port Priority 1 Priority 2 Priority 3 Priority 4

System Compress Discard Copies Schedule

Ingest Path

Ingest Engine WxIngest Serial WxByte Internet

UnZip Received Files

Enable Byte Blaster Server Support

Purge directories after hours.

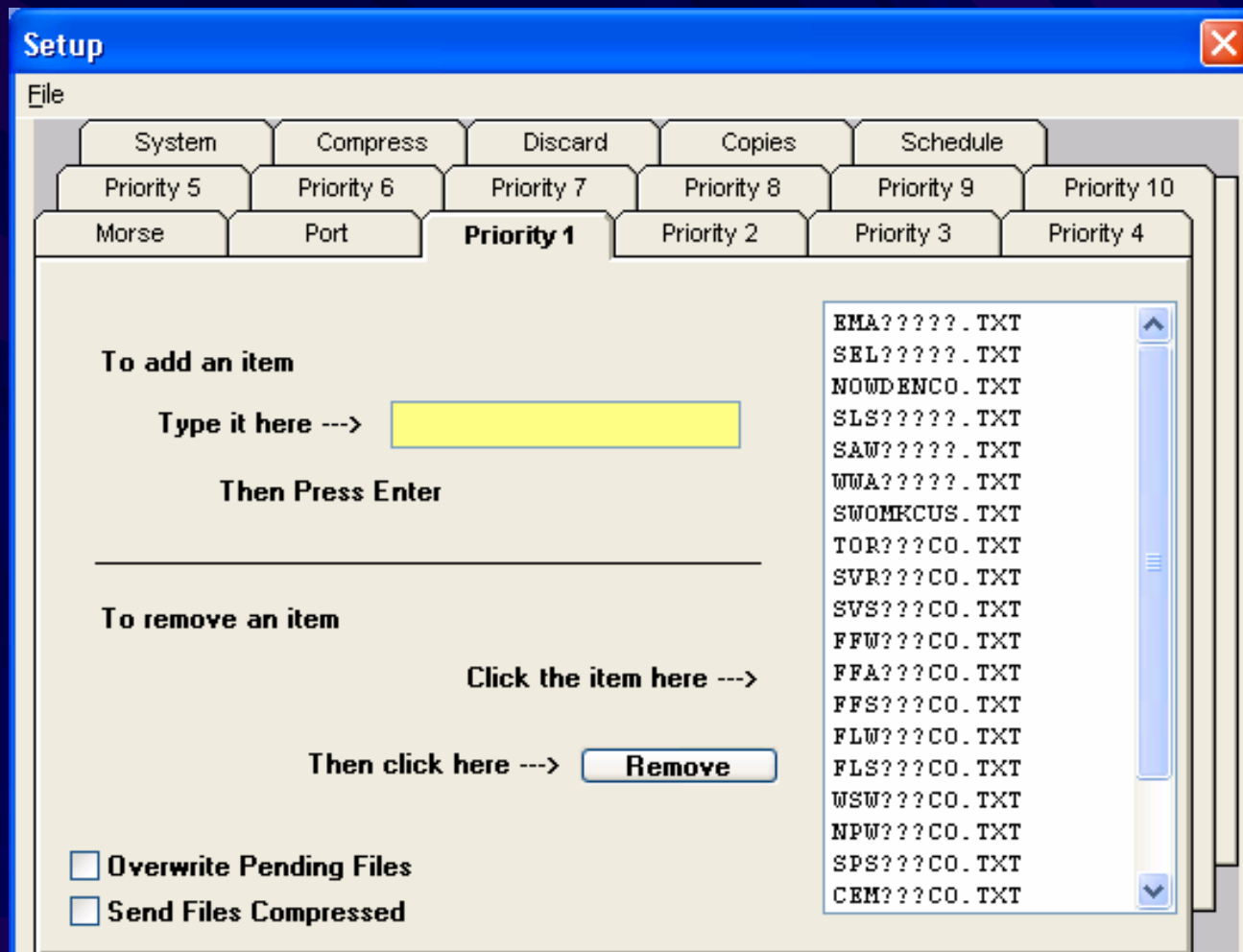
If all messages have been sent, send
by inserting it into:

Log file size

Log Sent Blocks Daily Log Files Show Errors

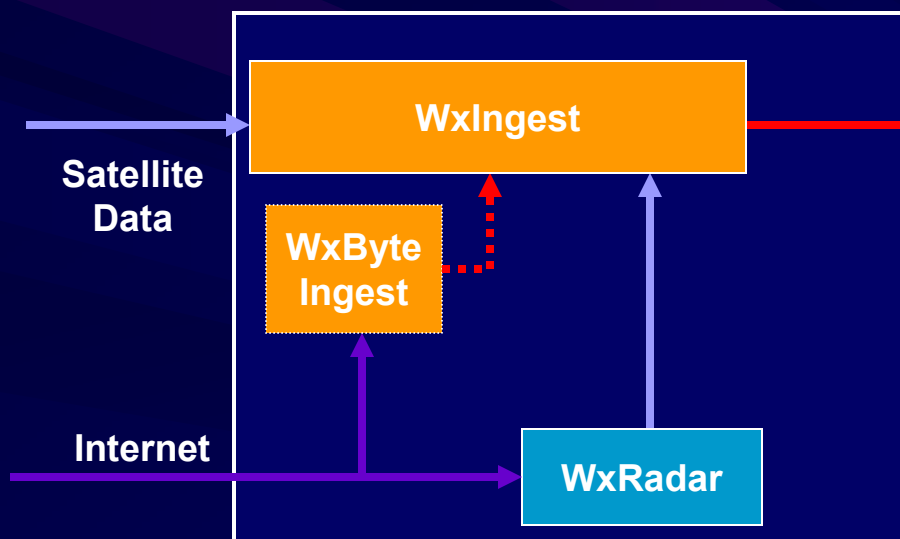


Retransmission Engine Setup

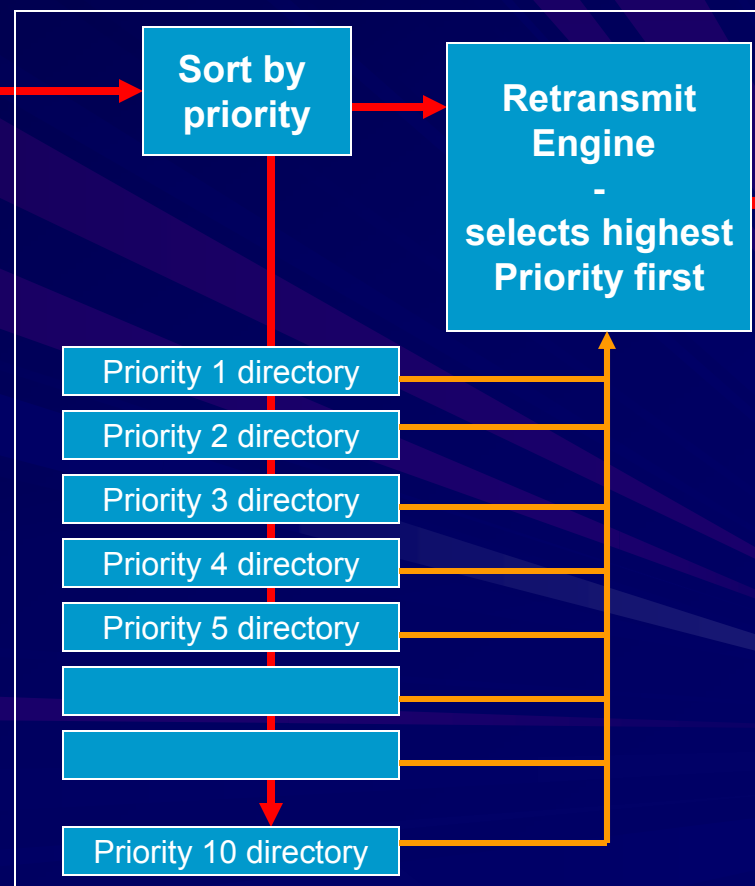


High Level Flow Diagram weather rebroadcast processes

Weather Message Server components

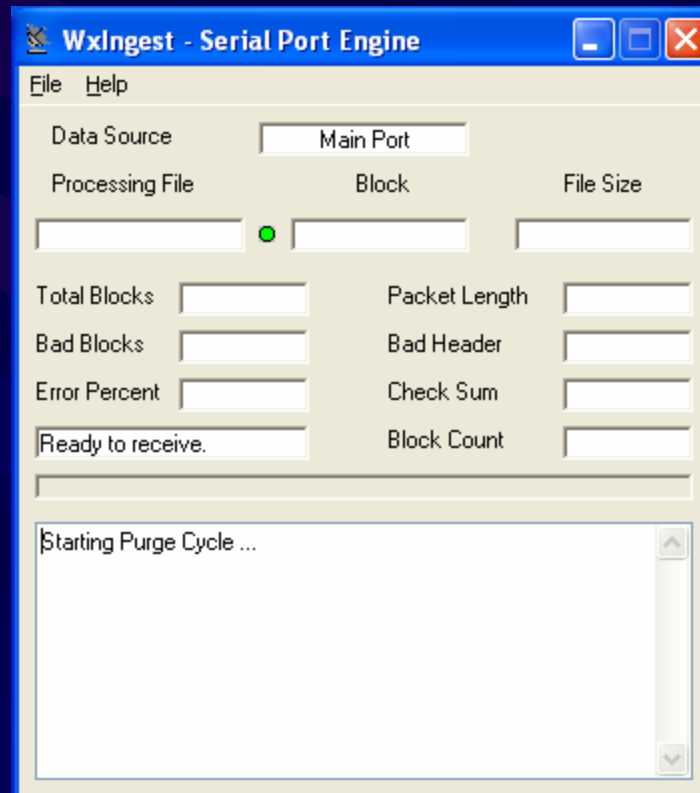


Wx Retransmission



WxIngest

- Processes serial data from satellite feed



WxIngest

- Configures serial port and enables WxByte to run when serial data feed is lost
 - See WxMesg archives for latest configuration

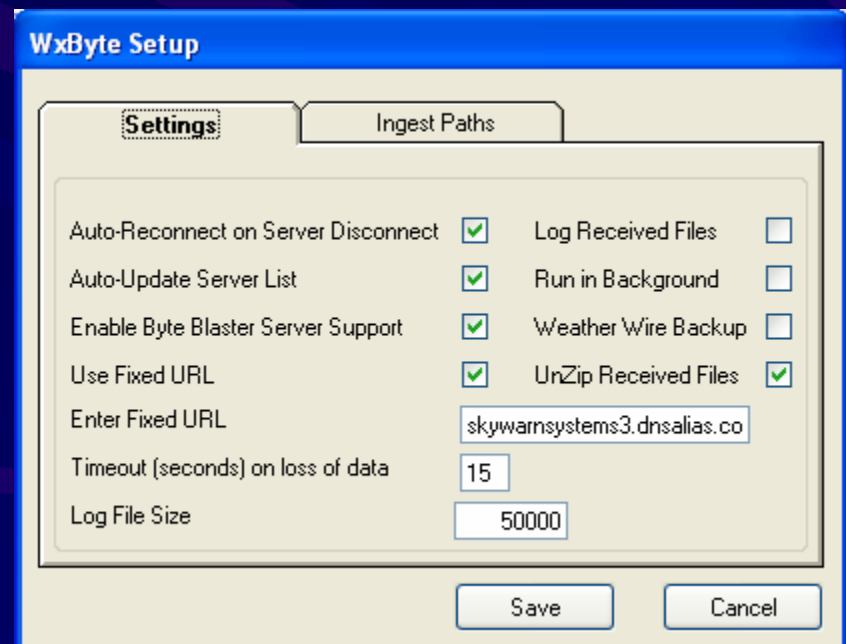
The screenshot shows the 'Settings' tab of the WxIngest Setup dialog. It contains two columns of settings. The left column includes: 'Comm Port' (dropdown set to 1), 'Baud Rate' (dropdown set to 9600,N,8,1), 'Log File Size' (text box with 50000), 'Log Received Files' (checkbox), 'Run in Background' (checkbox), 'UnZip Received Files' (checkbox checked), and 'Enable Byte Blaster Server Support' (checkbox checked). The right column, titled 'Backup Options', includes: 'Comm Port' (dropdown set to None), 'Baud Rate' (dropdown set to 9600,N,8,1), 'Switch Back Time' (text box with 0), 'WxByte Internet' (checkbox checked), and 'Error Rate Greater' (text box with 50). 'Save' and 'Cancel' buttons are at the bottom.

The screenshot shows the 'Ingest Paths' tab of the WxIngest Setup dialog. It features an 'Ingest Path' text box containing 'C:\Program Files\WxMesg\WxDData\Rx'. Below this is a section for 'Additional Distribution Paths' with a table of four empty text boxes. The first box contains the text 'm Files\WxMesg\WxDData\RxFiles2'. 'Save' and 'Cancel' buttons are at the bottom.



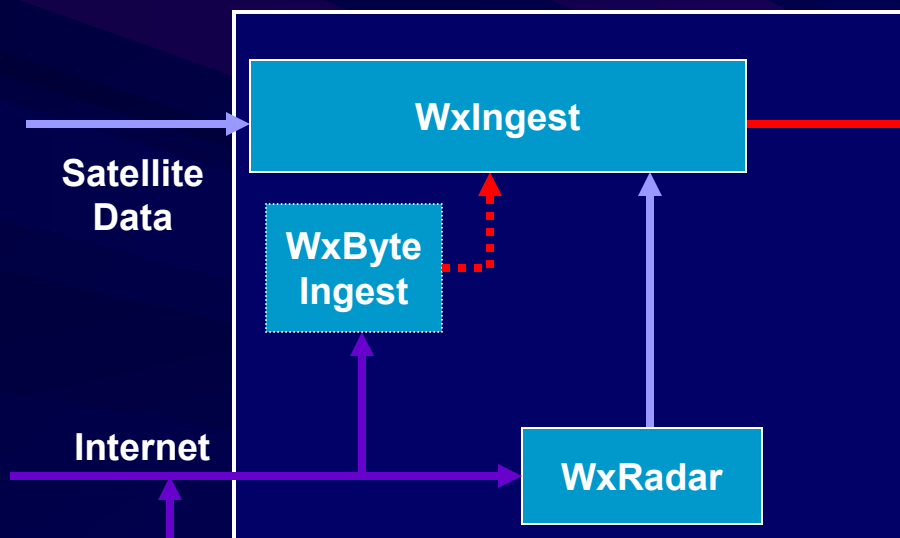
WxByte

- Pulls data from internet servers
 - Backup to satellite feed
 - System sends data alert after switching to WxByte
 - See WxMesg archives for latest configuration

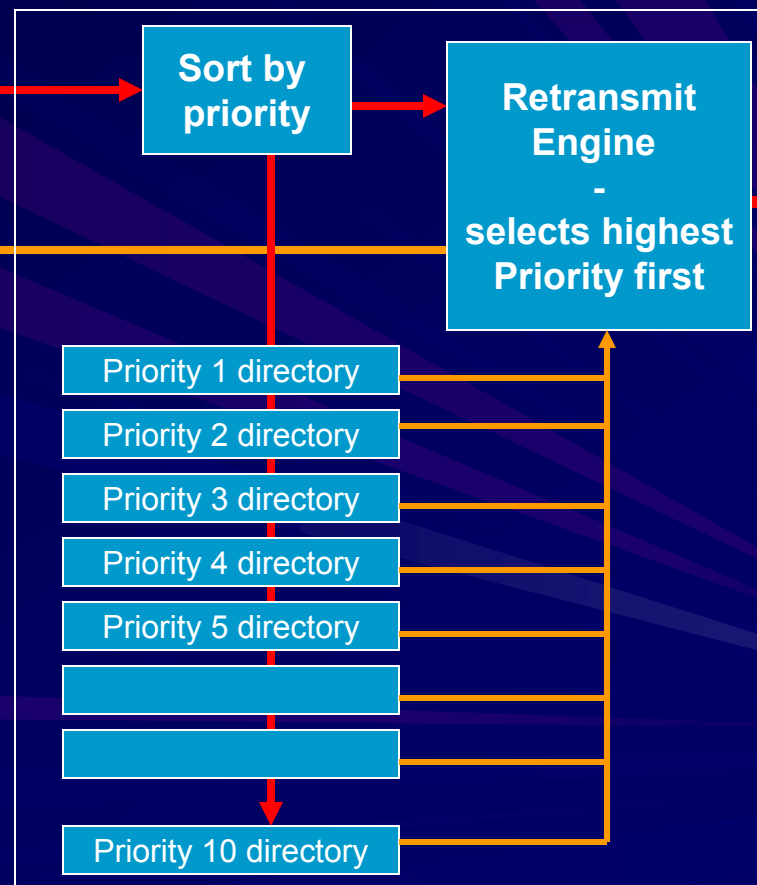


High Level Flow Diagram weather rebroadcast processes

Weather Message Server components



Wx Retransmission



ByteBlaster

Replicates
rebroadcast
Content for
Internet delivery



ByteBlaster

- Byteblaster runs from WxRetrans program
 - Replicates file stream for internet access

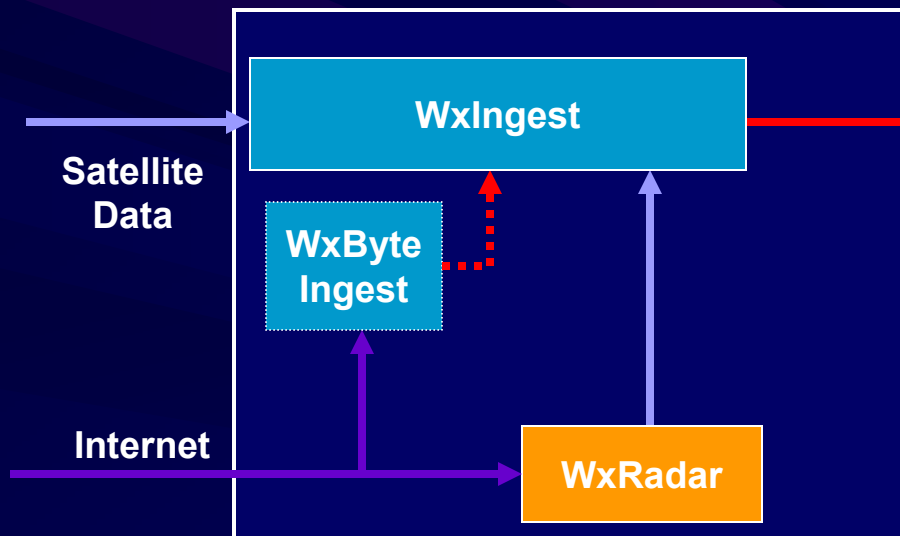
The screenshot shows the 'ByteBlaster Server - by Weather Message' window. It features a menu bar with 'File' and 'Help'. The main area contains several input fields and status indicators: 'Server Address' (72.64.126.162), 'Port' (1000), 'Allowed Clients' (10), and 'Server Type' (Private). Below these, the 'Status' is 'Receiving data from WxByte Engine', 'Data Quality' is 100%, 'Clients' is 0, 'Data Rate' is 0 kbps, and 'Pending Data' is 1. The 'Serving' field shows 'RADFTGCO.GIF - Block 7 of 37'.

The screenshot shows the 'WxBBSrvr Setup' dialog box. It contains several configuration options: 'Public EMWIN Server' (unchecked), 'Use Fixed Address' (unchecked), 'Fixed TCP/IP Address' (empty field), 'TCP/IP Port' (1000), 'Maximum Users' (10), 'Server Location' (EMWIN Denver Primary), 'Log Activity' (unchecked), and 'Show Errors' (unchecked). On the right side, 'Log File Size' is set to 100000 and 'Daily Log Files' is checked. At the bottom, there are 'Save' and 'Cancel' buttons.

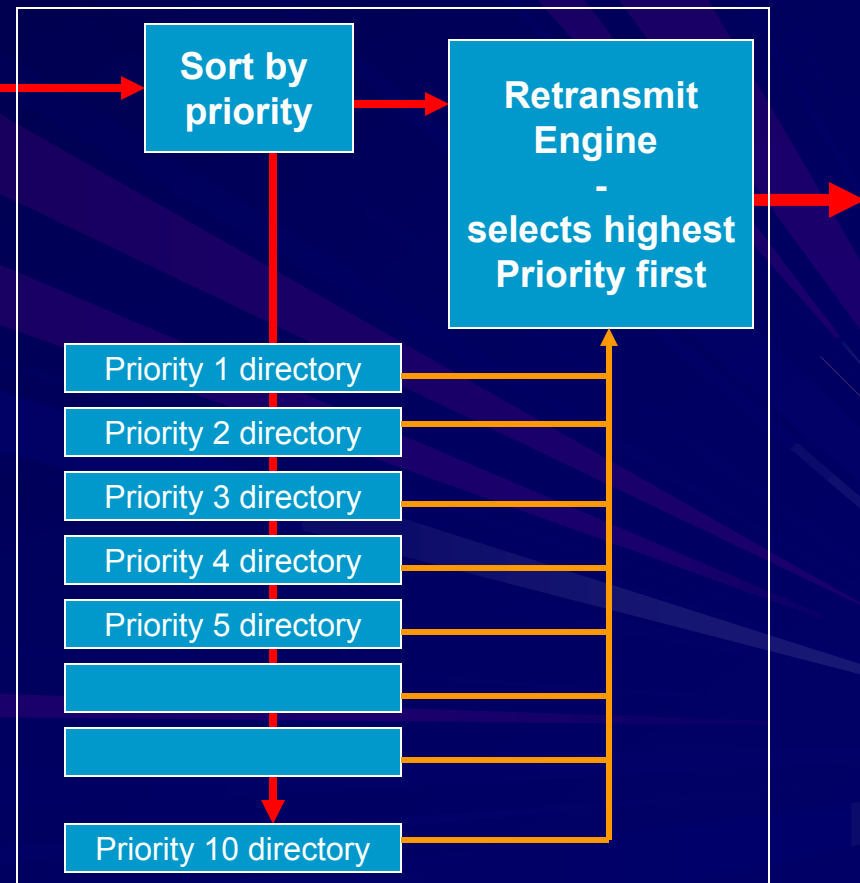


High Level Flow Diagram weather rebroadcast processes

Weather Message Server components



Wx Retransmission

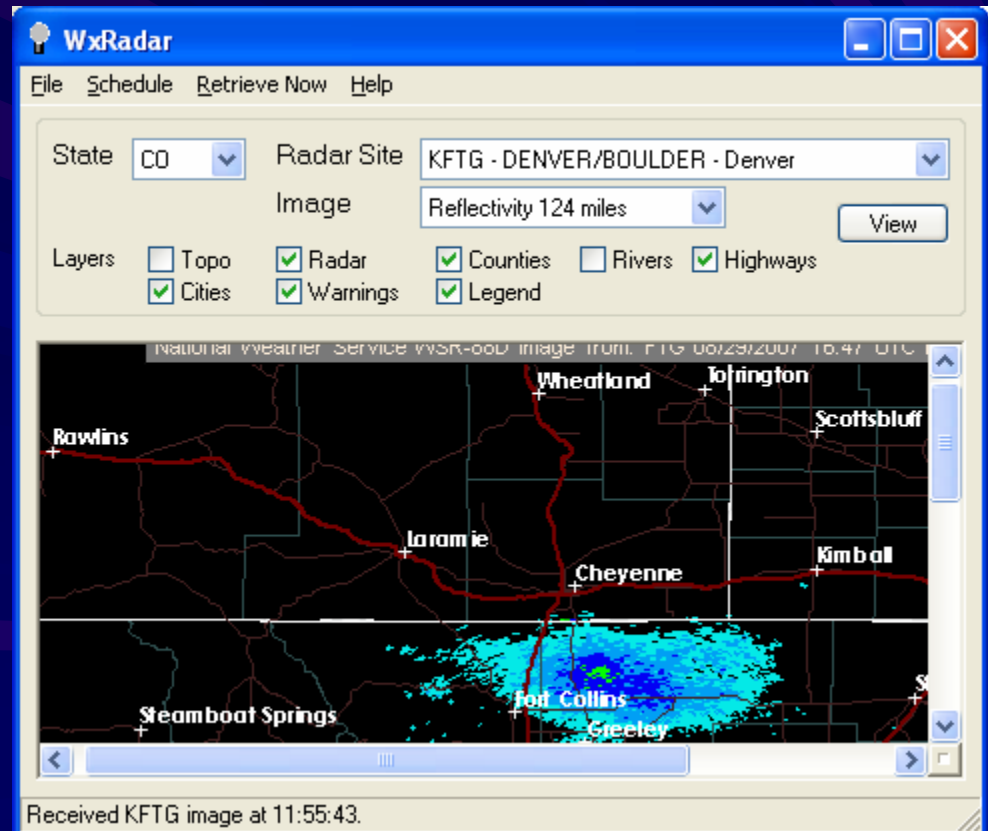


Replicates
rebroadcast
Content for
Internet delivery



WxRadar

- WxRadar inserts radar files into the EMWIN Retransmission directory structure
 - Captures latest radar images on a schedule
 - 5 minute intervals



WxRadar Schedule screen

WxRadar [Window Title Bar]

File Preview Retrieve Now Help

State: Radar Site:

Image:

Layers: Topo Radar Counties Rivers Highways
 Cities Warnings Legend

Radar Site	Interval	Image	File Name
KFTG	5 Minutes	Reflectivity 124 miles	RADFTGCO

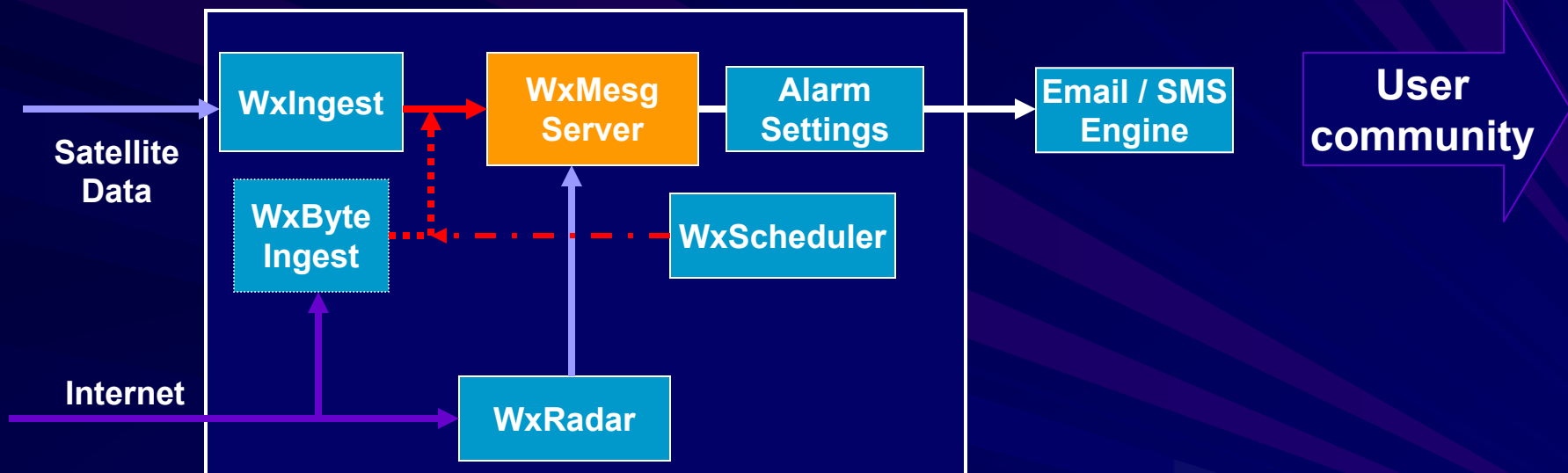
Interval: Minutes File Name: [Add] [Delete]



VII. EMWIN alerts - including Email and SMS

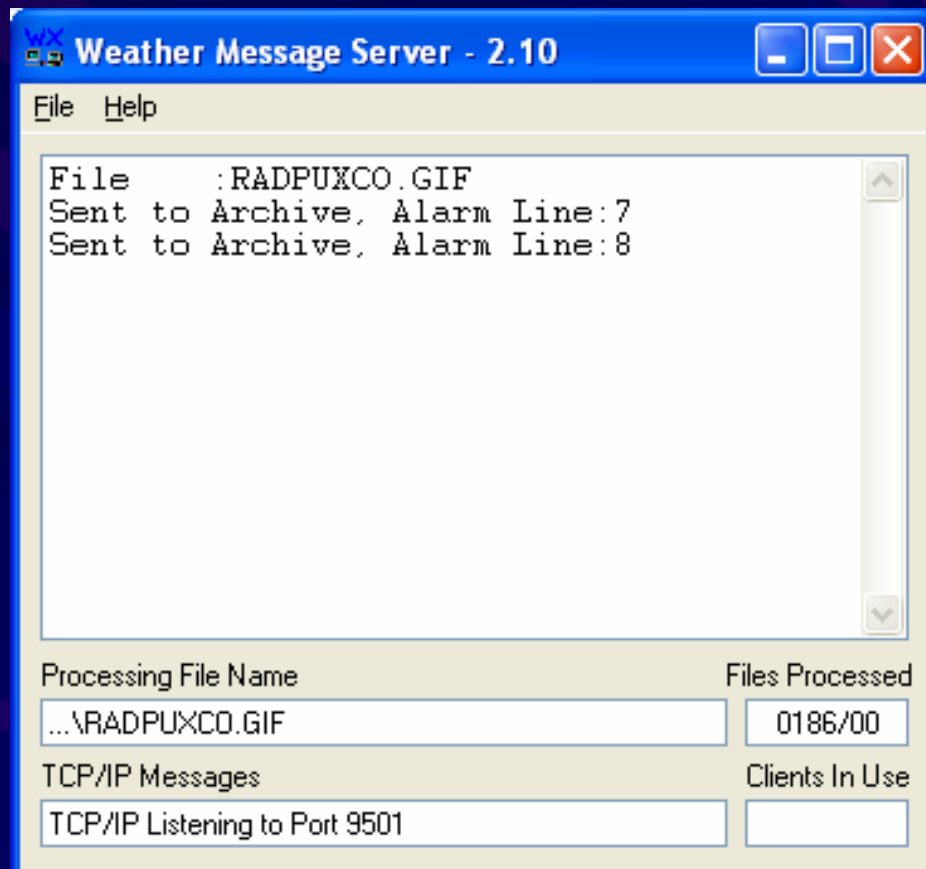


High Level Flow Diagram Weather Message Server Alert processes



WxMessage Server

- Main screen for Weather Message Server



WxMessage Alerts

- Set up screen to access alerts
 - Loss of Data (2 types)
 - Severe weather alert notifications

Weather Message Setup

File Support Setup Help

TCP/IP Port: 9501

Ingest Path: C:\Program Files\WxMesg\WxData\
Data Path: C:\Program Files\WxMesg\WxData\
Graphics Path: C:\Program Files\WxMesg\WxData\
Purge Time: 12 Hours UnZip Files:

Alarm File #: 1

Operating Mode:
Command Line Ingest Direct
Weather Node

Ingest Engine:
WxIngest Serial Weather Wire
WxByte Internet NoaaPort

Product	State	County	Pager	E Mail	Fax	Client	Alarm I
???BOU	CO	COC000	None	None	None	Yes	
???BOX	RI	RIC000	None	None	None	No	
???BOX			None	None	None	No	
???TFX			None	None	None	No	
AFD???	TX		None	None	None	No	
CFWBOX	AN	AN2237-AN2254	None	None	None	Yes	

Sort by Product Sort by County Sort by State Save Exit



WxMessage Data Alerts

Loss of Data alert (#1) Serial Ingest switches to WxByte

– Inserts ADMWXM message into the data stream

System configured to send email / SMS when Serial ingest switches to WxByte (internet feed) due to high error rate or serial data failure

**NOXX01 KWXM 231517 AAA
ADMWXM**

**ADMINISTRATIVE MESSAGE
WEATHER MESSAGE INGEST
917 AM MDT THU AUG 23 2007**

**WEATHER MESSAGE WXINGEST HAS SWITCHED TO SERIAL PORT INGEST,
PORT 1, ON EMWIN-DEN-AUX.**

\$\$

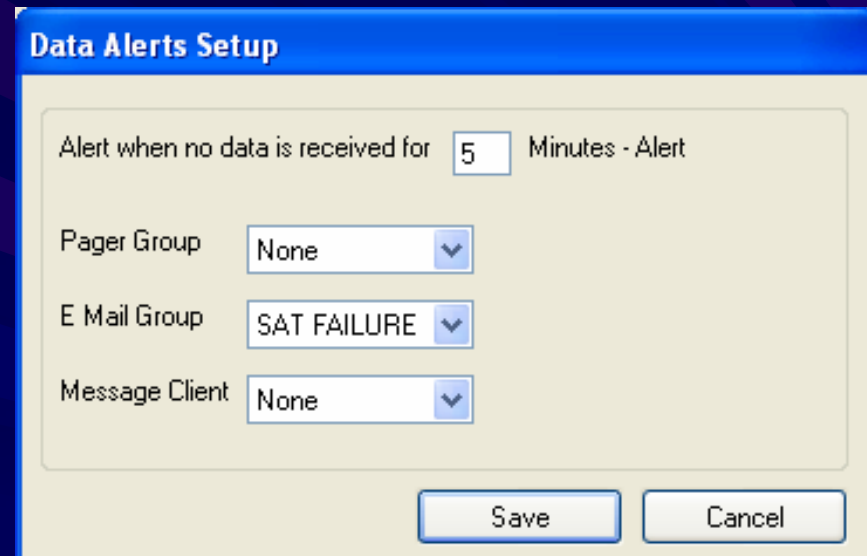


NOTE: Also reports when it switches back

WxMessage Data Alerts

Loss of Data alert (#2)

- sends email and/or SMS when LOD exceeds time threshold



The screenshot shows a dialog box titled "Data Alerts Setup". It contains the following fields and options:

- Alert when no data is received for: Minutes - Alert
- Pager Group: (dropdown arrow)
- E Mail Group: (dropdown arrow)
- Message Client: (dropdown arrow)

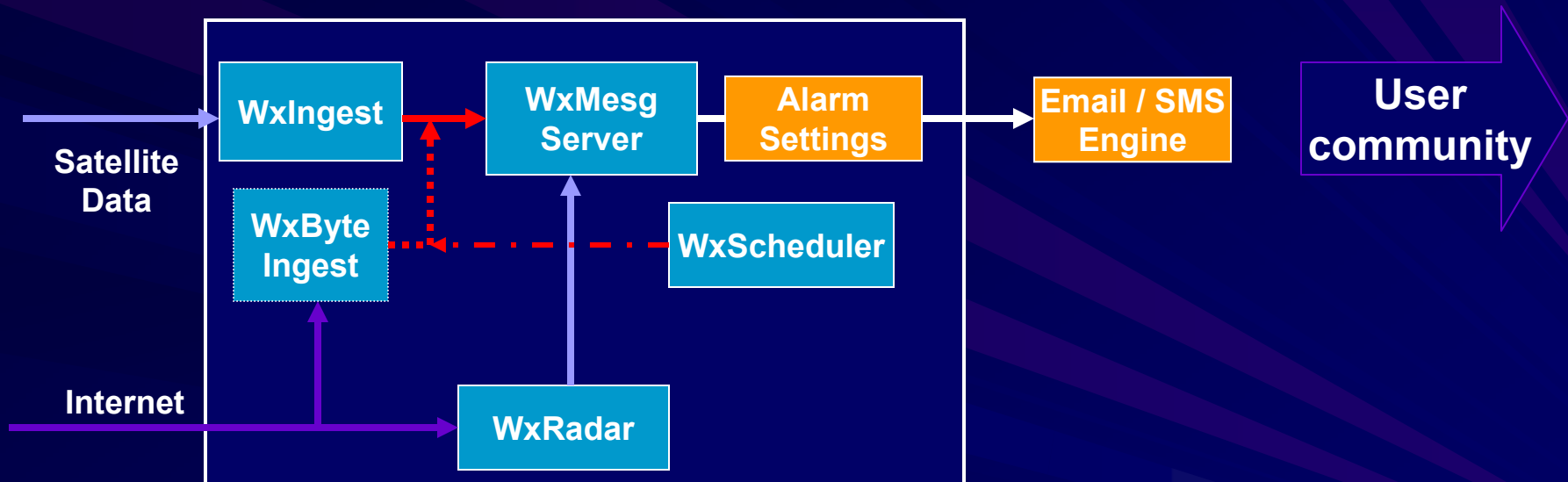
At the bottom right, there are two buttons: "Save" and "Cancel".

NOTE: Sent only when both ingest modes fail

Also reports recovery



High Level Flow Diagram Wx Message User Alert processes



WxMessage User Alerts

- Set up screen to access alerts
 - Severe weather alert notifications

Weather Message Setup

File Support Setup Help

TCP/IP Port: 9501

Ingest Path: C:\Program Files\WxMesg\WxData\
Data Path: C:\Program Files\WxMesg\WxData\
Graphics Path: C:\Program Files\WxMesg\WxData\
Purge Time: 12 Hours UnZip Files:

Alarm File #: 1

Operating Mode:
Command Line: Ingest Direct:
Weather Node:

Ingest Engine:
WxIngest Serial: Weather Wire:
WxByte Internet: NoaaPort:

Product	State	County	Pager	E Mail	Fax	Client	Alarm I
???BOU	CO	COC000	None	None	None	Yes	
???BOX	RI	RIC000	None	None	None	No	
???BOX			None	None	None	No	
???TFX			None	None	None	No	
AFD???	TX		None	None	None	No	
CFWBOX	AN	AN2237-AN2254	None	None	None	Yes	

Sort by Product Sort by County Save Exit

Sort by State



Alarm Configuration

Edit Alarm # 11 - SVRBOU

List Products List Forecast Offices List States

Alarm Client/ Map/ X10 Paging/Email/Fax Archive/Html/Exe

Product: Severe Thunderstorm Warning
WFO Denver, CO

State: ▾

Counties:

<input checked="" type="checkbox"/>	Boulder	COC013	▴
<input checked="" type="checkbox"/>	Broomfield	COC014	▾
<input checked="" type="checkbox"/>	Denver	COC031	
<input checked="" type="checkbox"/>	Douglas	COC035	
<input checked="" type="checkbox"/>	Jefferson	COC059	▾

 VTEC Active

Match Text:

Exclude Text: Alarm Active



WxMessage Distribution Lists

- Email and / or SMS groups configured within WeatherMessage

E-Mail Setup

SMTP Server:

E-Mail Address:

E-Mail From:

Group Name	Style	Subject	Size	Maximum	Parse	Time Zone	Addr
SAT FAILURE	Full	Full	0	0	No	Mountain	kb0t
TEST MSG	Full	Full	0	0	No	Mountain	720f
TEXT MSG - SMS	Short	None	160	1	Yes	Mountain	720f
EMAIL MSGS	Full	Full	0	0	No	Mountain	asar



Email groups

- Enter recipients in E-mail list box
 - Entry format is: Address <space> name

Edit E-Mail Group

Group Name: EMAIL MSGS

Style: Full

Subject Style: Full

Size: 0

Maximum: 0

Parse: No

Time Zone: Mountain

Create Group E-Mail Header/Trailer

Create Group Short Message

Address Entry Format:
address [space] name
john@server.com John Doe

E-Mail List
Put each email address on a separate line.

asandman@co.adams.co.us Adams County
Robert.Glancy@noaa.gov NWS Boulder
Bob.Wold@state.co.us Bob Wold Colorado

Save Cancel



WxMessage Distribution Lists

- Select email group for each alarm

Edit Alarm # 11 - SVRBOU

List Products List Forecast Offices List States

Alarm Client/ Map/ X10 **Paging/Email/Fax** Archive/Html/Exe

E Mail Group

- EMAIL MSGS
- TEXT MSG - SMS
- None
- SAT FAILURE
- TEST MSG

Pager Group

- None

Fax Group

- None

Time Restrict: No

Time Begin: HH:MM - Start Receiving

Time End: HH:MM - Stop Receiving

Days of Week: S M T W T F S

Save Cancel

NOTE: Time restrictions available for each alarm



Current Email System Alerts

The Denver EMWIN System sends email messages to Emergency Managers for the following weather-related products:

Flood / Flash Flood

FFABOU	Flash Flood Advisory
FFSBOU	Flash Flood Statement
FFWBOU	Flash Flood Warning
FLSBOU	Flood Statement
FLWBOU	Flood Warning

Other Severe Weather

SVRBOU	Severe Thunderstorm Warning
SVSBOU	Severe Weather Statement
TORBOU	Tornado Warning
NPWBOU	Non Precipitation Warning
WCNBOU	Severe Weather Watch County Notification
WSWBOU	Winter Storm Warning

OTHER

TSTBOU	Weekly Test Messages
--------	----------------------



Time Restrictions

- Time Restrict limits hours in which an alarm is sent
 - Can limit by
 - Hour of the day
 - Day of the week
 - NOTE: Default is 24 X 7 alerting
 - Can also hold alarms until “allowed” hours are reached
 - ;i.e., late night alerts sent early next morning



Message Parsing – “short message”

- Can format messages to fit text messaging limits set by carriers

Short Message Setup for Group - TEXT MESG - SMS

Short Message VTEC Message Options

Short Message Text

NWS has \$Action\$ a \$MesgType\$\$IfCounty: for
\$\$Counties\$\$IfCounty: County\$\$IfExpire: until
\$\$Expire\$

NWS has Issued a Tornado Warning for Jefferson
County until 10:00 PM

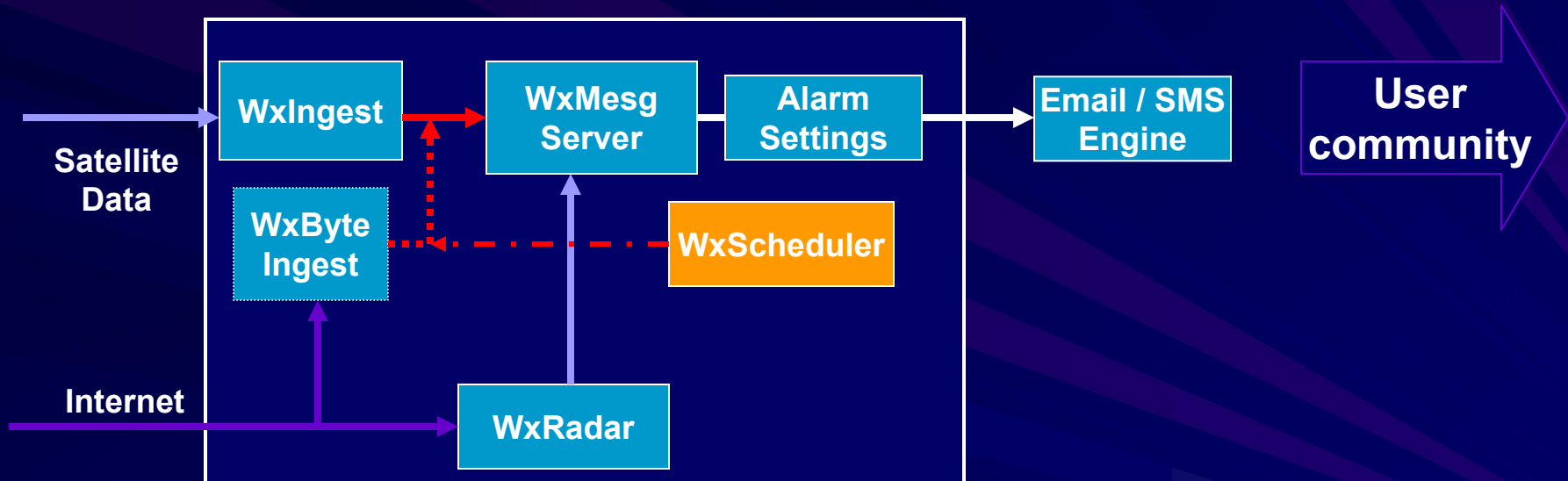
Available Variables

- \$WFO\$
- \$Action\$
- \$MesgType\$
- \$HeadLine\$
- \$BulletAT\$
- \$Issued\$
- \$Issued24\$
- \$Expire\$
- \$Expire24\$
- \$ExpDay\$

Save Cancel

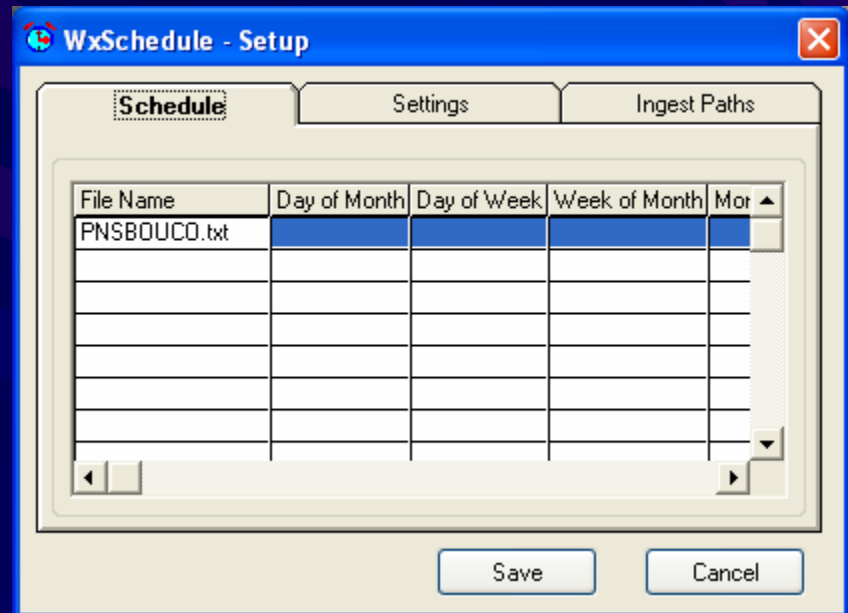
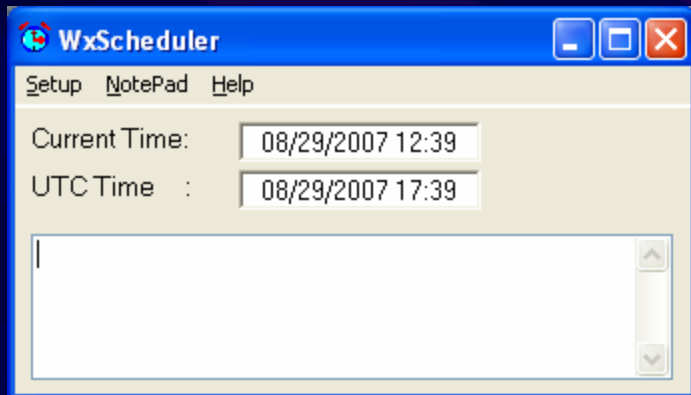


High Level Flow Diagram Weather Message Server processes



WxScheduler

- Utility application to insert weekly test message



Weekly Test Message

WUUS52 KBOU 301600
TSTBOU
COZ000-301615-

TEST WARNING
SKYWARN SYSTEMS TEST VEHICLE
1000 AM MDT THU AUG 30 2007

THIS IS A TEST OF THE DENVER EMWIN AUX COMPUTER.

THIS MESSAGE IS PROVIDED EACH THURSDAY @ 10 AM LOCAL TIME TO
CONFIRM THE EMWIN SYSTEM IS PROVIDING PROPER ALERT CAPABILITIES.

PLEASE ADDRESS QUESTIONS AND COMMENTS TO KSTEWART@UDFCD.ORG.

\$\$\$\$



NOTE: sent to email and SMS users

Afternoon BREAK

15 minutes

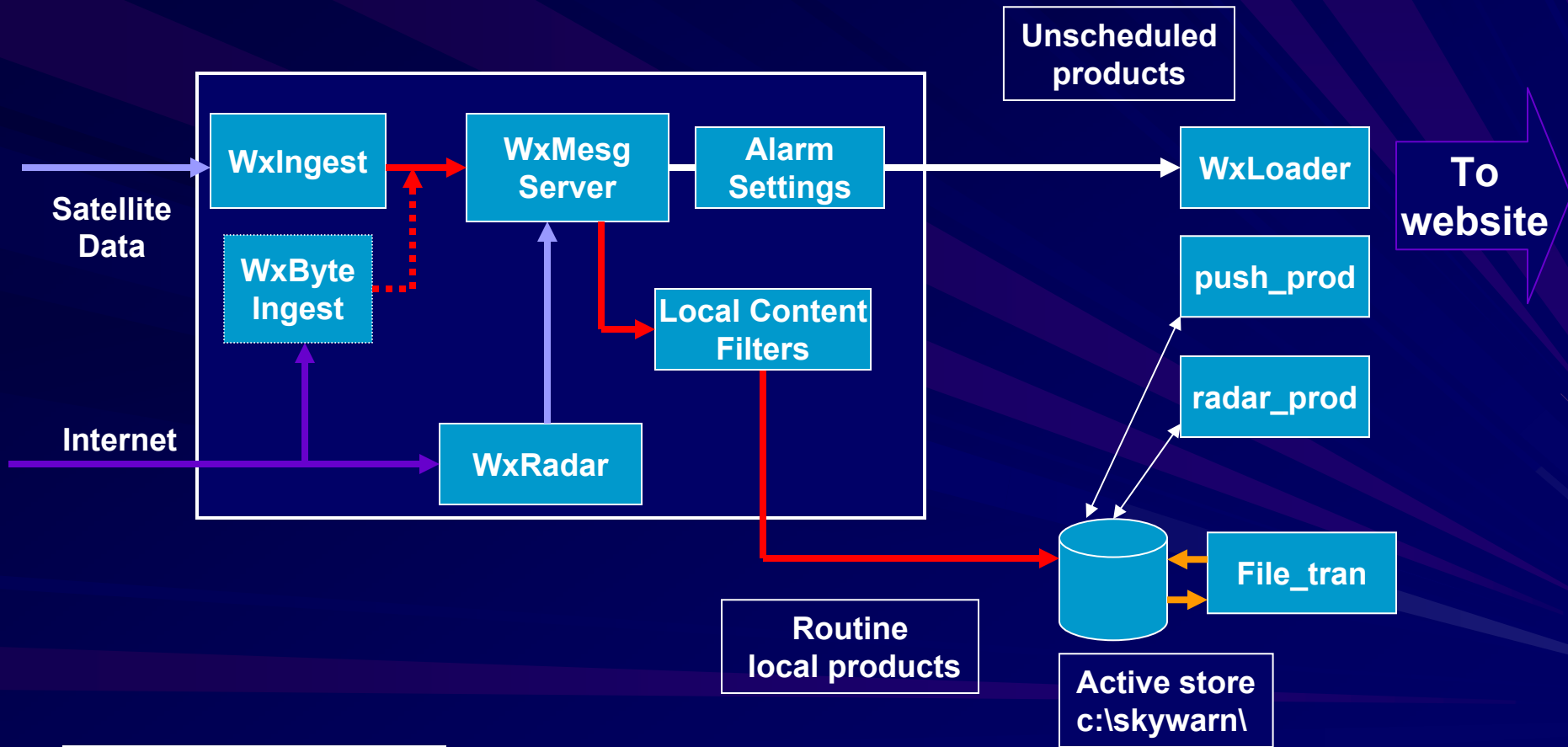


VIII. EMWIN web page



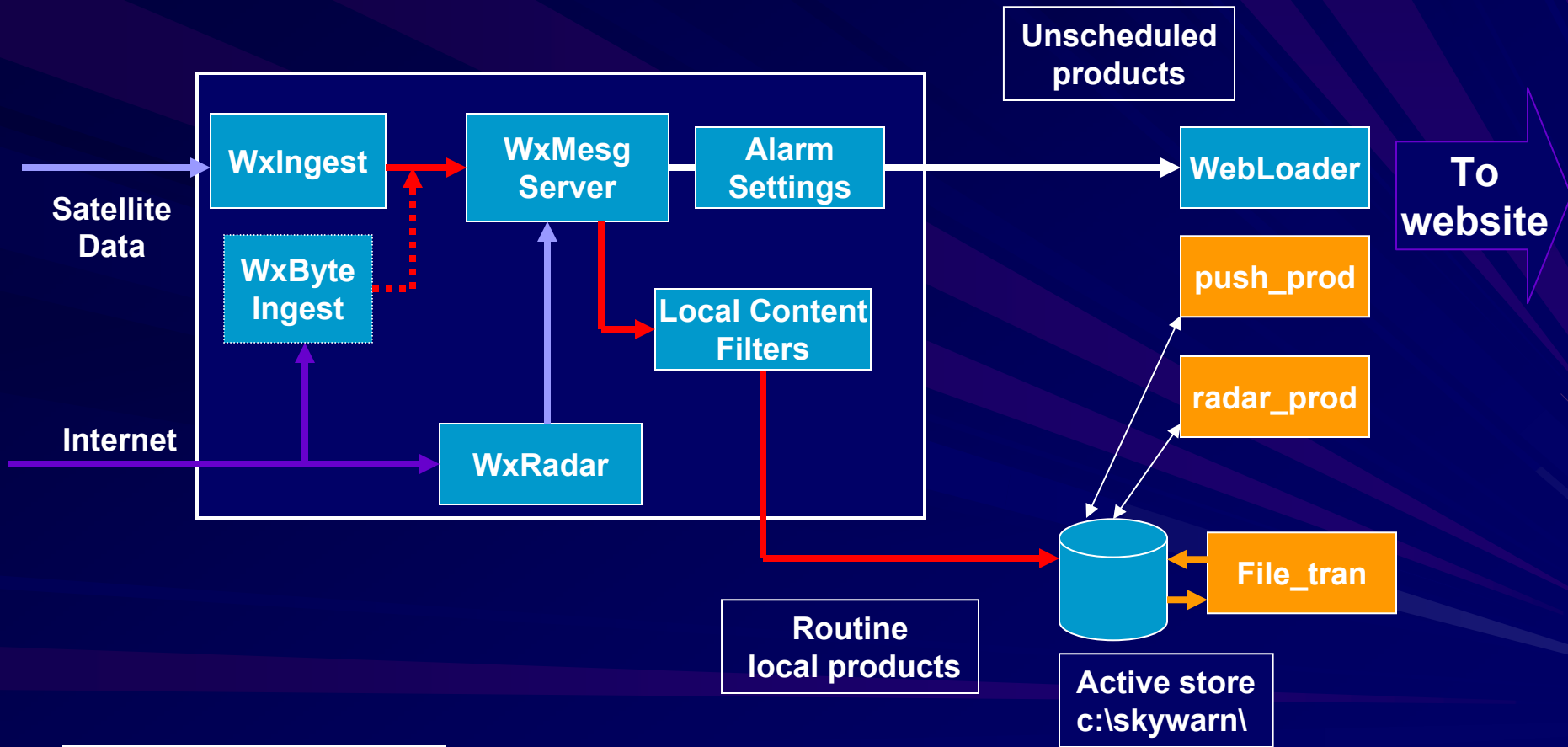
High Level Flow Diagram

Web page delivery processes



High Level Flow Diagram

Web page delivery processes



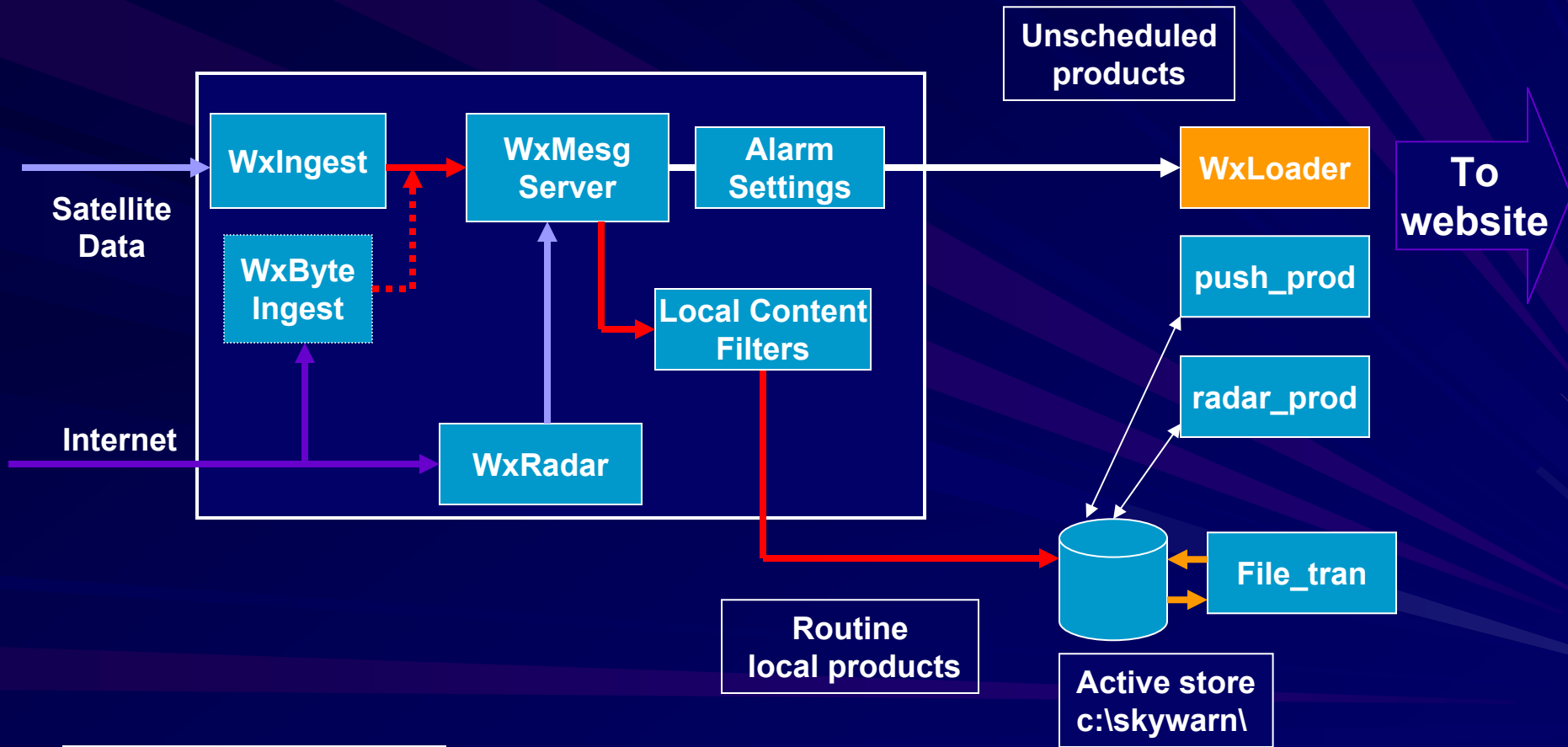
PERL Scripts

- Used to send files to web page with ftp protocol
- For scheduled (routine) products
 - Routine text files
 - Radar images
- Scripts run in background – auto start at bootup



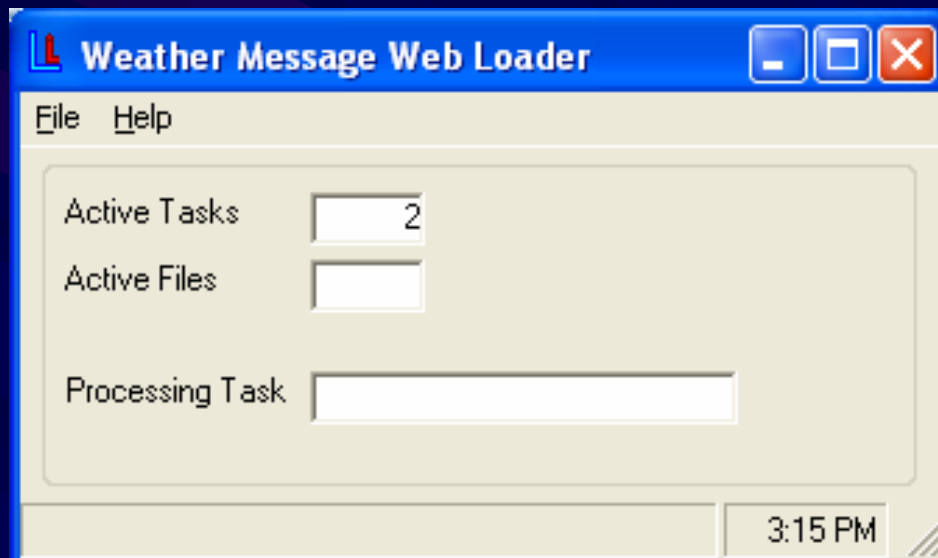
High Level Flow Diagram

Web page delivery processes



WebLoader

- Sends files to web page using ftp protocol
- For unscheduled (watch /warning) products



- Sends updates to web site only when changes occur
- Inserts "default" message when product is not active



EMWIN Weather Web Page

The screenshot shows a web browser window with the address bar containing <http://emwin.udfcd.org/weather.htm>. The page content includes:

- A dark grey header bar with the text "EMWIN Denver" in white.
- A link labeled "EMWIN Denver Homepage" in red text.
- A horizontal line with three small red squares in the center.
- The main heading: "Colorado North Central Region Emergency Management Emergency Manager's Weather Information Network (EMWIN) Report Selector".
- A grid of six buttons arranged in two rows of three:

Today's Weather Colorado Front Range	Current Conditions & Outlooks National Maps	Radar Images Local & Regional
Flood & Hydrology Colorado Front Range	Severe Weather Products Colorado Front Range	Satellite Images Colorado & National

Below the grid are two more buttons:

- Summaries
- EMWIN Information & Links

The browser's status bar at the bottom shows "Internet" and "100%" zoom level.



http://emwin.udfcd.org/ssi_demo.htm

VIII. EMWIN web page

Message Insertion



Coming Soon: Message Insertion Tool

Denver Front Range EMWIN Message Injector - Windows Internet Explorer

H:\Denver\Denver Web Page\injector_demo_3.htm

File Edit View Favorites Tools Help

Denver Front Range EMWIN Message Injector

Denver Front Range Emergency Manager Notification System

Select Message Type: Local Alert Message

Select Notification Area: Denver Metro Area

Enter Message Text
(max 2000 Characters):

THIS IS A TEST OF THE DENVER FRONT RANGE EMERGENCY MANAGER NOTIFICATION SYSTEM.

THIS IS ONLY A TEST. DO NOT TAKE ANY ACTION BASED ON THIS ALERT.

Effective For: 2 hours

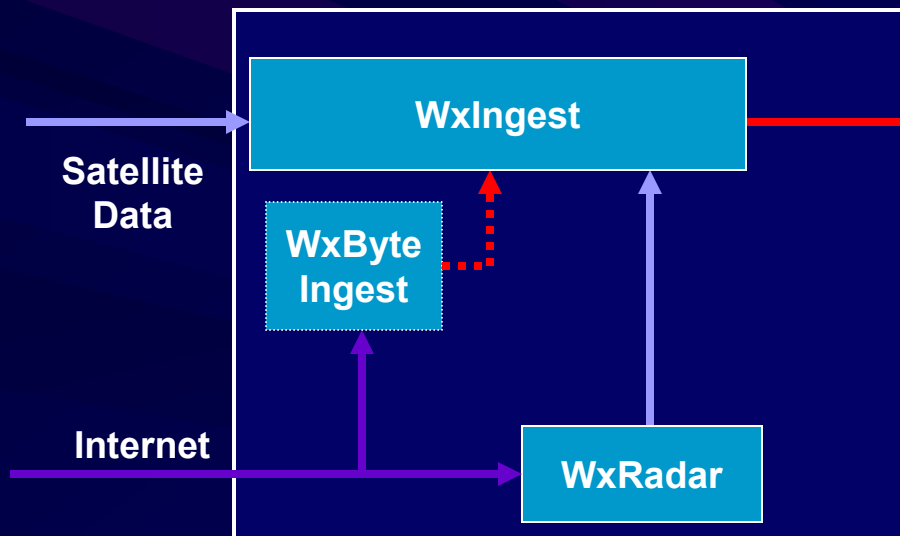
SEND

My Computer 100%

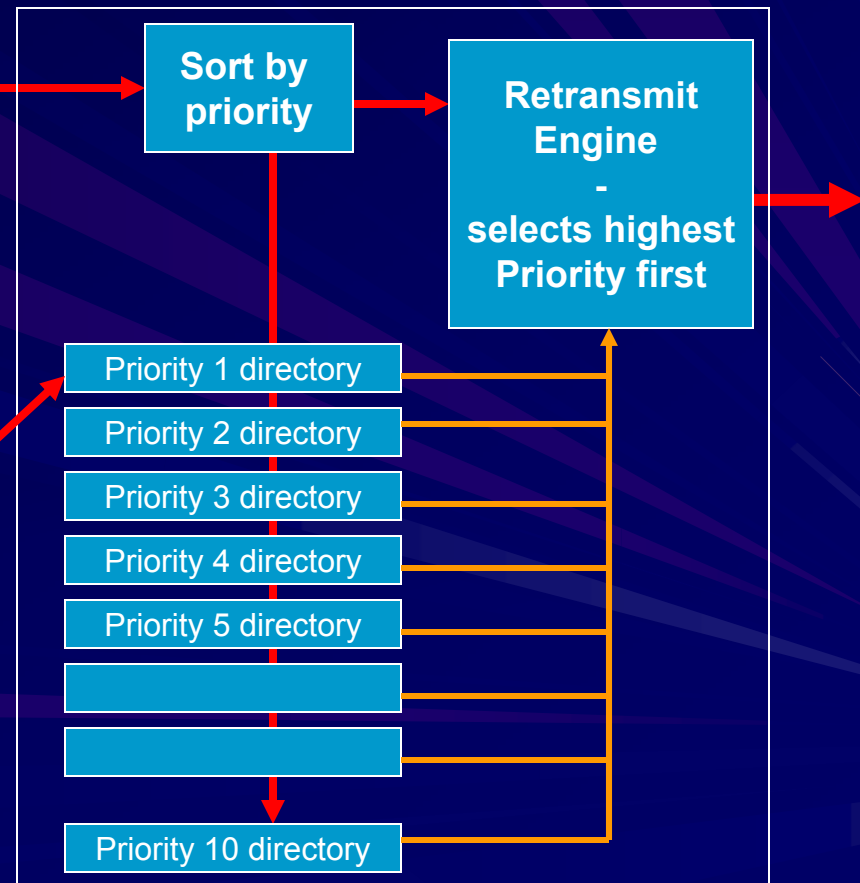


High Level Flow Diagram weather rebroadcast processes

Weather Message Server components



Wx Retransmission



**Message Insertion ftp's
content here**



IX. Remote access to computers



Remote Access

- Separate MS Word file description
 - “Remote Access” folder

- “hands on” log in and remote access



APPENDIX



Applications Families

■ Weather Message Server

- WxIngest – processes serial data from satellite receiver
- WxByte – internet input
- WxScheduler
- WebLoader
- WxMap
- WxClient

■ EMWIN Retransmission Engine

- WxIngest – processes serial data from satellite receiver
- WxByte – internet input
- WxRadar – inserts radar images on schedule
- ByteBlaster – pushes ReTrans data through internet



Weather product terminology

SAMPLE TEXT WEATHER PRODUCT

WFUS55 KBOU 122148

TORBOU COC123-122230

/O.NEW.KBOU.TO.W.0050.070712T2146Z-070712T2230Z/

BULLETIN - EAS ACTIVATION REQUESTED

TORNADO WARNING NATIONAL WEATHER SERVICE DENVER CO

346 PM MDT THU JUL 12 2007

THE NATIONAL WEATHER SERVICE IN DENVER HAS ISSUED A

TORNADO WARNING FOR... CENTRAL WELD COUNTY IN NORTHEAST COLORADO UNTIL
430 PM MDT

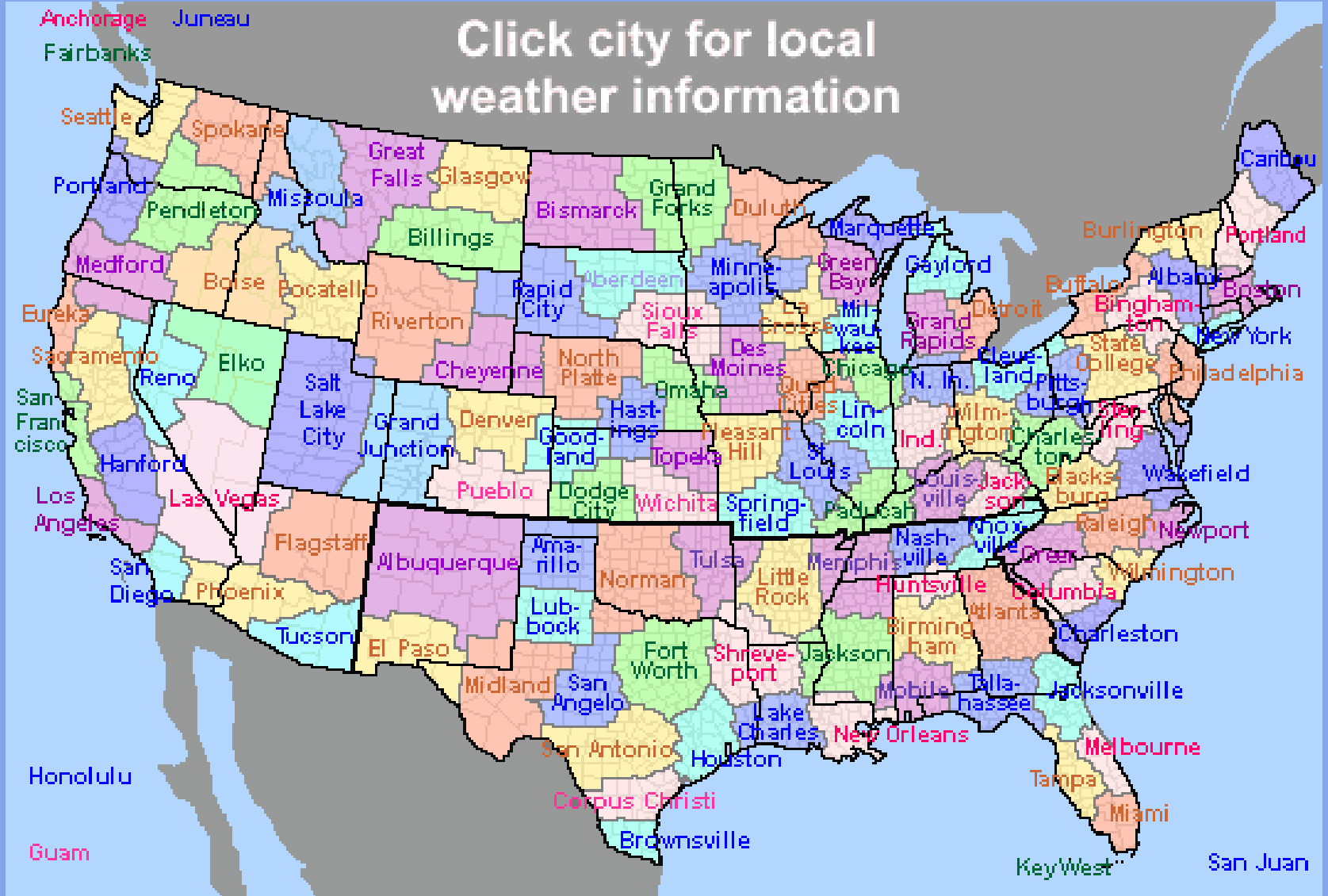
AT 346 PM MDT...LAW ENFORCEMENT REPORTED A TORNADO 1 MILES EAST OF
AULT OR ABOUT 12 MILES NORTH NORTHEAST OF GREELEY. THIS STORM WAS MOVING
SOUTH AT 15 MPH. * LOCATIONS IN THE WARNING INCLUDE BUT ARE NOT LIMITED TO
WINDSOR... SEVERANCE...PURCELL...PIERCE...NUNN...LUCERNE...GILL...

GALETON... EATON...BRIGGSDALE...BARNESVILLE...AULT AND NORTH CENTRAL GREELEY.
THE SAFEST PLACE TO BE DURING A TORNADO IS IN A BASEMENT. GET UNDER A
WORKBENCH OR OTHER PIECE OF STURDY FURNITURE. IF NO BASEMENT IS
AVAILABLE...SEEK SHELTER ON THE LOWEST FLOOR OF THE BUILDING IN AN INTERIOR
HALLWAY OR ROOM SUCH AS A CLOSET. USE BLANKETS OR PILLOWS TO COVER YOUR
BODY AND ALWAYS STAY AWAY FROM WINDOWS. IF IN MOBILE HOMES OR
VEHICLES...EVACUATE THEM AND GET INSIDE A SUBSTANTIAL SHELTER. IF NO SHELTER
IS AVAILABLE...LIE FLAT IN THE NEAREST DITCH OR OTHER LOW SPOT AND COVER YOUR
HEAD WITH YOUR HANDS.

LAT...LON 4078 10417 4081 10489 4047 10493 4042 10419



Click city for local weather information



VTEC

- Valid Time Event Coding



P-VTEC String: /k.aaa.cccc.pp.s.####.yymmddThhnnZ_B-yymmddThhnnZ_E/
H-VTEC String: /nwsli.s.ic.yymmddThhnnZ_B.yymmddThhnnZ_C.yymmddThhnnZ_E.fr/

P-VTEC String

Event Group
 k - Product Class (O, T, E, X)
 aaa - Action (NEW, CON, EXT, EXA, EXB, UPG, CAN, EXP, COR, ROU)
 cccc - Office ID (e.g., KLWX)
 pp - Phenomena (e.g., BZ, FF - see table)
 s - Significance (W, A, Y, S, F, O, N)
 #### - Event Tracking Number (ETN) - (e.g., 0001, 0002, etc.)
 ETN is coded as 0000 for ROU events.

Date/Time Group

yymmddThhnnZ_B - Event Beginning Date/Time
 yymmddThhnnZ_E - Event Ending Date/Time
 yy - year
 mm - month
 dd - day
 T - fixed time indicator
 hh - hour
 nn - minute
 Z - fixed UTC indicator

Product Class (k)	Actions (aaa)	Phenomena (pp)		
O Operational product	NEW New event	AF Ashfall	FR Frost	LE Lake Effect Snow
T Test product	CON Event continued	AS Air Stagnation	FW Fire Weather	LO Low Water
E Experimental product	EXT Event extended (time)	BS Blowing Snow	FZ Freeze	LS Lakeshore Flood
X Experimental VTEC in an Operational product	EXA Event extended (area)	BW Brisk Wind	GL Gale	LW Lake Wind
	EXB Event extended (both time and area)	BZ Blizzard	HF Hurricane Force Wind	MA Marine
	UPG Event upgraded	CF Coastal Flood	HI Inland Hurricane	RB Small Craft for Rough Bar
	CAN Event cancelled	DG Dust Storm	HS Heavy Snow	SB Snow and Blowing Snow
	EXP Event expired	DU Blowing Dust	HT Heat	SC Small Craft
	COR Correction	EC Extreme Cold	HU Hurricane	SE Hazardous Seas
	ROU Routine	EH Excessive Heat	HW High Wind	SI Small Craft for Winds
		EW Extreme Wind	HY Hydrologic	SM Dense Smoke
		FA Areal Flood	HZ Hard Freeze	SN Snow
		FF Flash Flood	IP Ice Storm	SR Storm
		FG Dense Fog	IS Ice Storm	SU High Surf
		FL Flood	LB Lake Effect Snow and Blowing Snow	SV Severe Thunderstorm
				SW Small Craft for Hazardous Seas
				TI Inland Tropical Storm
				TO Tornado
				TR Tropical Storm
				TS Tsunami
				TY Typhoon
				UP Ice Accretion
				WC Wind Chill
				WI Wind
				WS Winter Storm
				WW Winter Weather
				ZF Freezing Fog
				ZR Freezing Rain

H-VTEC String

Event Group
 nwsli - NWS Location Identifier
 s - Flood Severity (0, N, 1, 2, 3, U)
 ic - Immediate Cause (ER, SM, etc.)
 fr - Flood Record (NO, NR, UU, OO)

Date/Time Group

yymmddThhnnZ_B - Flood Begin Date/Time
 yymmddThhnnZ_C - Flood Crest Date/Time
 yymmddThhnnZ_E - Flood End Date/Time

yy - year
 mm - month
 dd - day
 T - fixed time indicator
 hh - hour
 nn - minute
 Z - fixed UTC indicator

NWS Location Identifier (nwsli)	Flood Timing	Flood Record Status (fr)
FALK2 Sample NWSLI - first three characters unique to a point, last two characters unique to the state/territory	yymmddThhnnZ _B - time flood stage/flow is exceeded	NO A record flood is not expected
00000 NWSLI is coded as zeros for areal products	yymmddThhnnZ _C - time of maximum stage/flow	NR Near record or record flood expected
	yymmddThhnnZ _E - time for fall below flood stage/flow	UU Flood without a period of record to compare
		OO For areal flood warnings, areal flash flood products, and flood advisories (point and areal)
Flood Severity (s)	Immediate Cause (ic)	
N None	ER Excessive Rainfall	FT Upstream Flooding plus Tidal Effects
0 areal flood or flash flood products	SM Snowmelt	ET Elevated Upstream Flow plus Tidal Effects
1 Minor	RS Rain and Snowmelt	WT Wind and/or Tidal Effects
2 Moderate	DM Dam or Levee Failure	DR Upstream Dam or Reservoir Release
3 Major	IJ Ice Jam	MC Other Multiple Causes
U Unknown	GO Glacier-Dammed Lake Outburst	OT Other Effects
	IC Rain and/or Snowmelt and/or Ice Jam	UU Unknown
	FS Upstream Flooding plus Storm Surge	