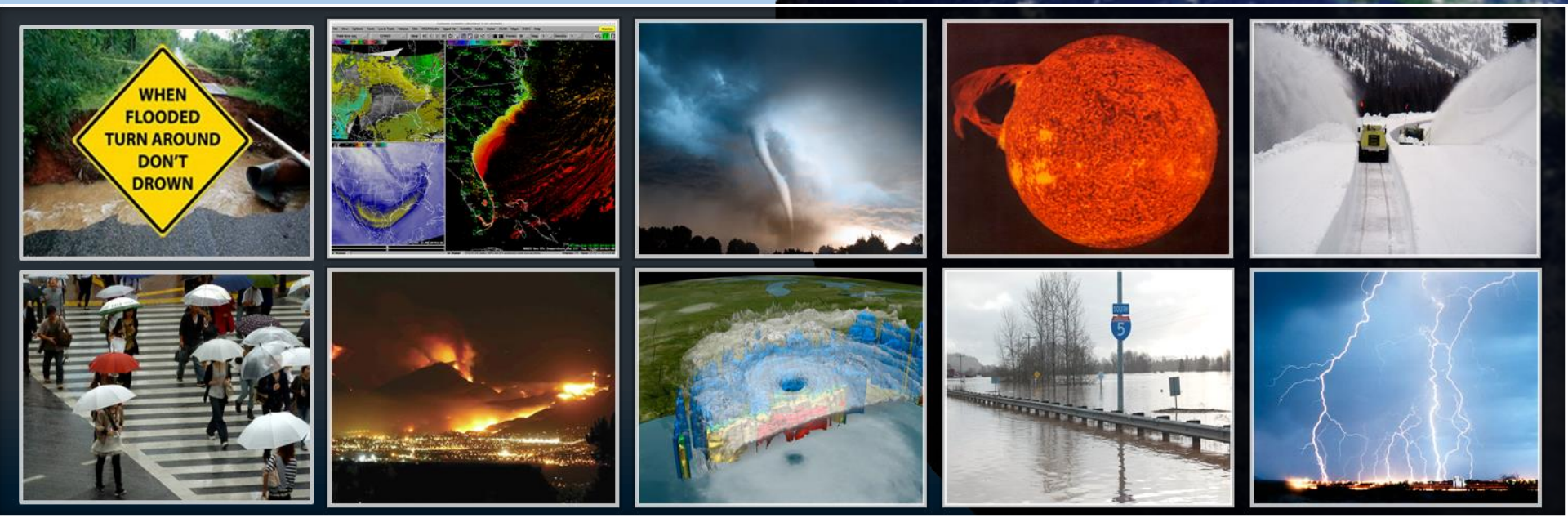
Building a Weather-Ready Nation

Dissemination Technical Session
NWS Partners Meeting
November 1, 2016 • Silver Spring, MD



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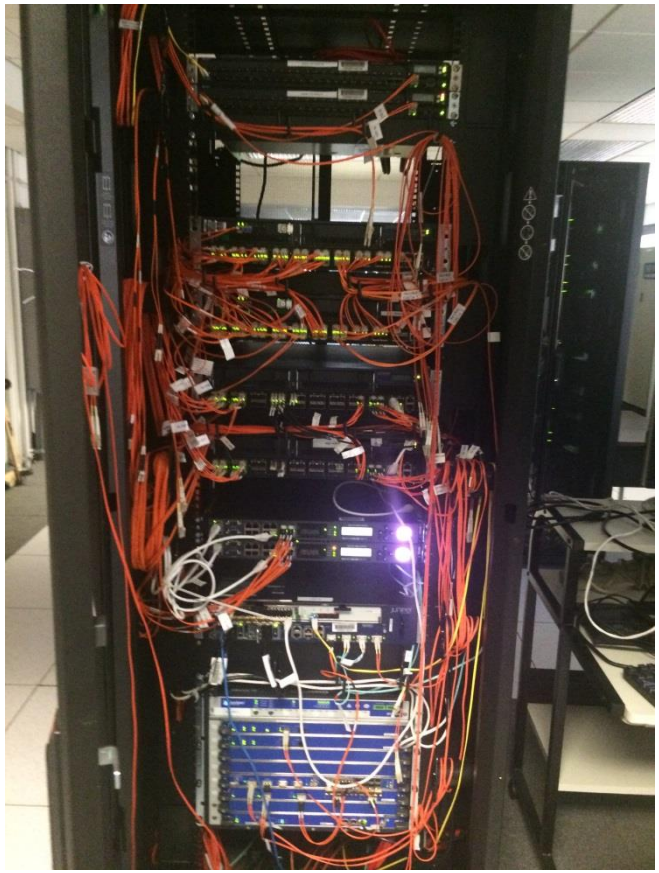
Historical Context

Legacy NWS Dissemination Reality

- NWS Telecommunications Gateway & numerous data stores and websites across NWS regions
- Developed incrementally over time; not reflective of a coherent technical vision
- Primary gateway site located in Silver Spring in spaces not designed for data centers
- Application complexity contributed to failures and limits effectiveness of backup (75%)
- Recognized by 2013



Legacy dissemination systems not adequate for our mission

Historical Context

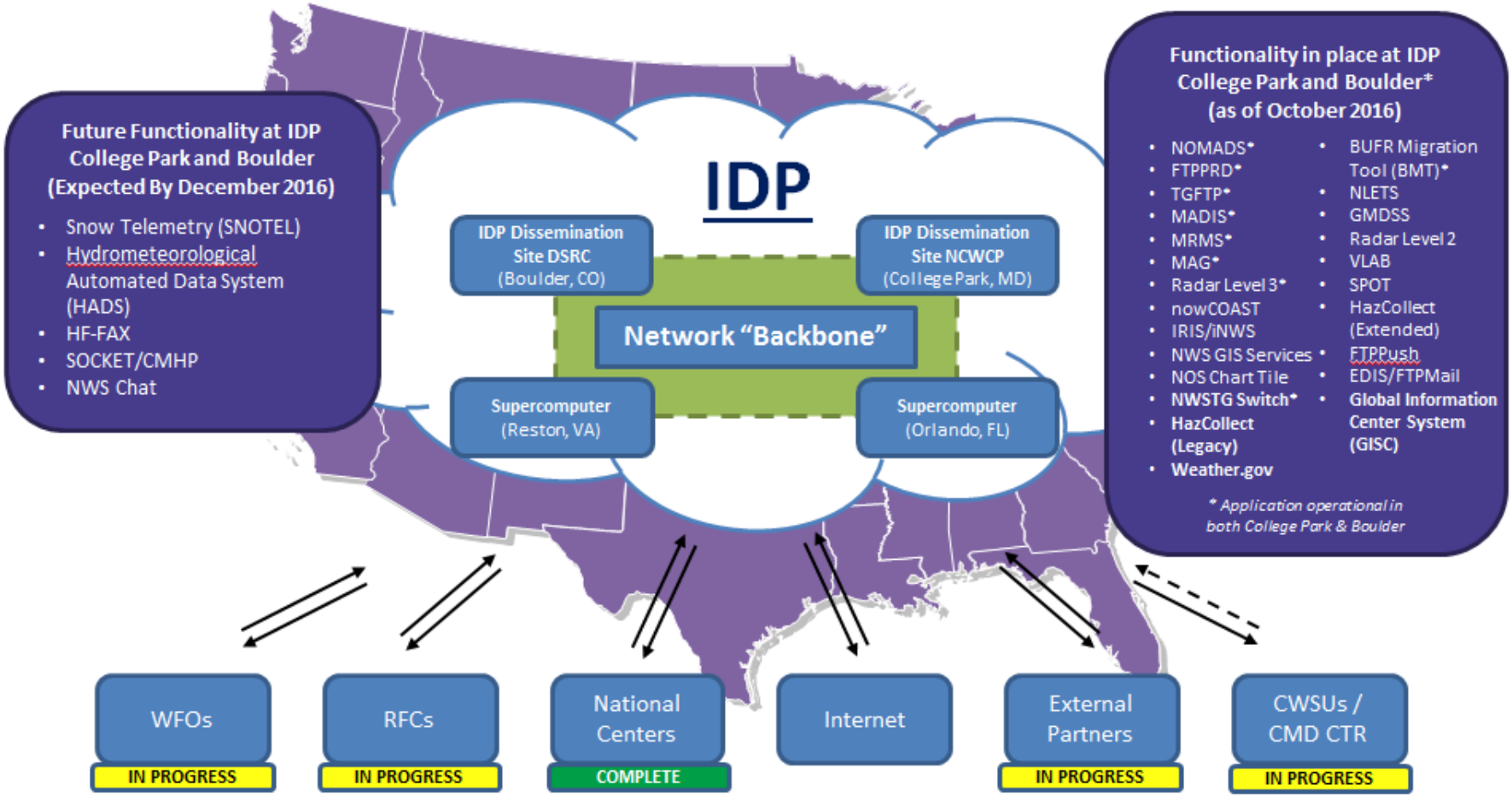
Integrated Dissemination Program (IDP)

- Started in 2013
- 100% primary & backup dissemination services and geographically diverse
- Improved bandwidth, resilience, redundant, scalable, secure operational networks & systems
- Increased access to environmental data using diverse methods & data formats
- Program (IDP) transforming enterprise dissemination services including NWS' dissemination infrastructure to provide timely and reliable dissemination of weather, water, and climate data, forecasts and warnings
- Very capable but complex, involving continuing big effort

IDP is the multi-year response to ensure reliable and secure information dissemination to support our mission

Integrated Dissemination Program (IDP)

Long-Term Sustainable Solution



Future Functionality at IDP College Park and Boulder (Expected By December 2016)

- Snow Telemetry (SNOTEL)
- Hydrometeorological Automated Data System (HADS)
- HF-FAX
- SOCKET/CMHP
- NWS Chat

Functionality in place at IDP College Park and Boulder* (as of October 2016)

- NOMADS*
- FTPPRD*
- TGFTP*
- MADIS*
- MRMS*
- MAG*
- Radar Level 3*
- nowCOAST
- IRIS/iNWS
- NWS GIS Services
- NOS Chart Tile
- NWSTG Switch*
- HazCollect (Legacy)
- Weather.gov
- BUFR Migration Tool (BMT)*
- NLETS
- GMDSS
- Radar Level 2
- VLAB
- SPOT
- HazCollect (Extended)
- FTPPush
- EDIS/FTPMail
- Global Information Center System (GISC)

** Application operational in both College Park & Boulder*

"OneNWS" Network

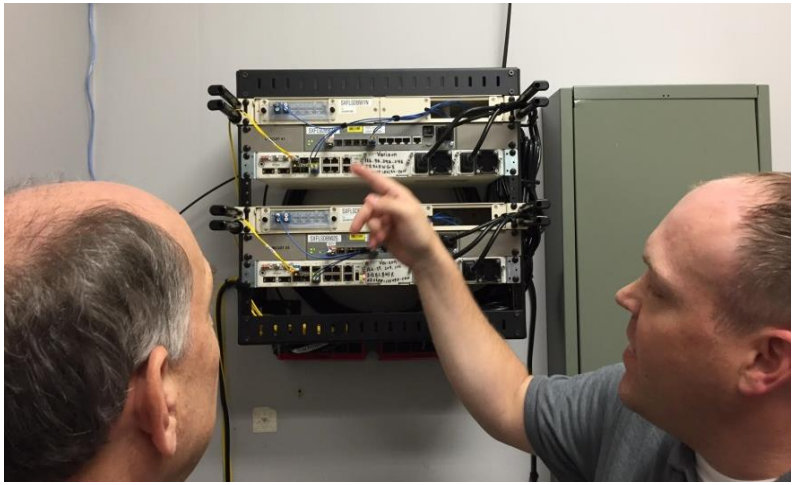
The future OneNWS network will consolidate all operational networks (OPSnet, Regional, etc.) as single managed network under NCEP Central Operations (NCO).

NWS Dissemination Approach

Technical

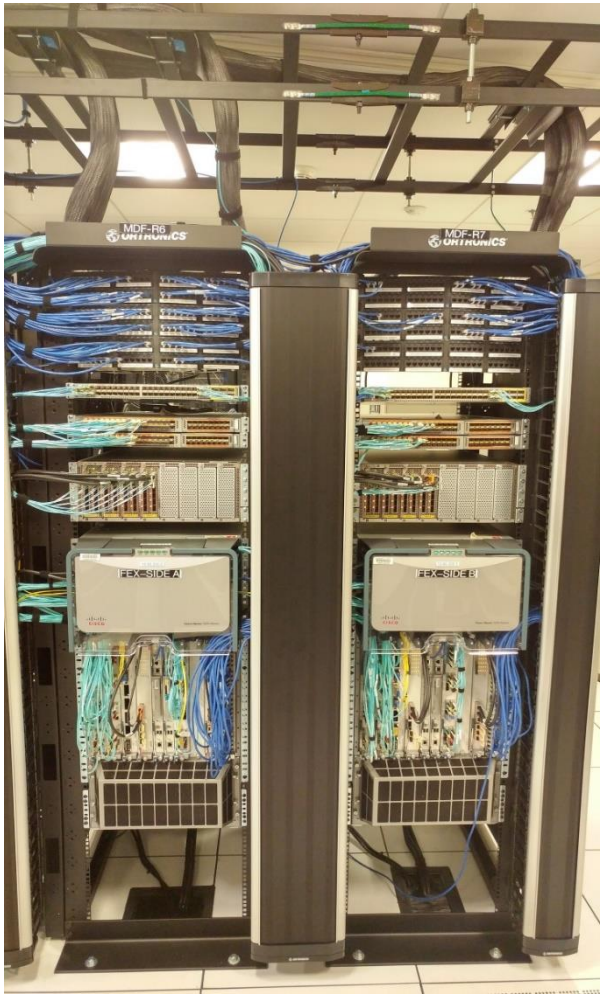
NWS Dissemination Approach

Technical



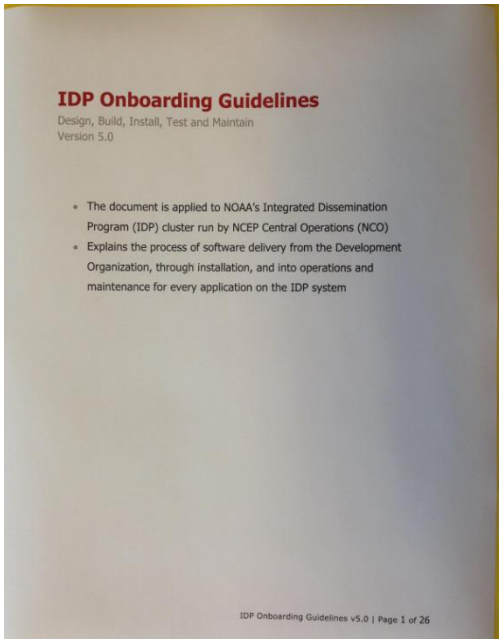
NWS Dissemination Approach

Technical



NWS Dissemination Approach
Management

- Single accountable organization managing the monitoring and performance of a technically robust system
- Defined, repeatable 7/24 operational support including improved monitoring and problem resolution processes
- Improved reliability using mature configuration management, security patching and applications onboarding processes



SSMC3 Background and Outages

- SSMC3 is one of the NOAA buildings in the Silver Spring, MD campus and hosts IT infrastructure for NOAA

- August 22, 2015, SSMC3 scheduled power outage for maintenance impacted systems nearly nationwide

- September 9-11, 2016 SSMC3 unscheduled power outage due to intermittent power fluctuations created minimum impacts to customers

Integrated Dissemination Program (IDP)

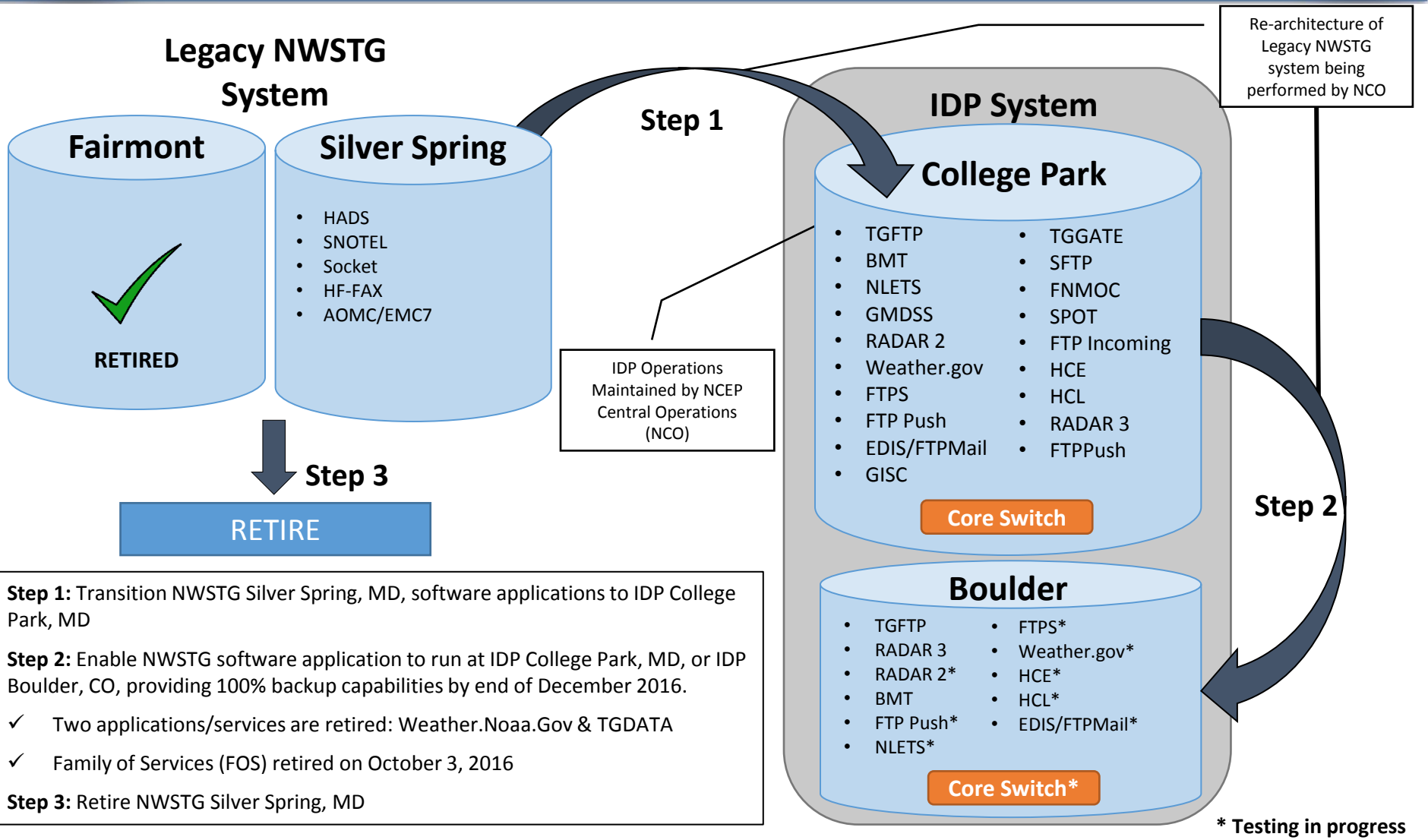
SSMC3 Outages and Lessons Learned

August 22, 2015 Issues	Lessons Learned from Aug 2015	Impact with Sep 11, 2016 Outage
1. NLETS did not fail over when the primary router was lost power.	Although the Standard Operating Procedures adds all configuration to the backup router, the step was missed in the last maintenance cycle.	None
2. Several services were unavailable due to LDAP outage: • **HP OpenView** • **NIDS Content Mgt System** • **NLETS** • **AWIPS II Thin Client** • **EMRS Access** • **NDBC**	2a. Unaware LDAP East Server would be impacted because it was located in Largo, MD facility; however, the communication circuit impacted. The engineering solution assumed East, Mountain and West severs are configured on each of the systems that require LDAP. 2b. It was difficult to bring in engineers to make changes on weekend or afterhours.	• None except for the time it took to manually migrate the NIDS CMS system to LDAP West. • Internet capacity was cut in half but that only affected a few high-powered NOMADS users. Their downloads were slow but the system was accessible. NOMADS and FTP operations was moved to IDP-Boulder to offload Internet traffic from Silver Spring campus.
3. Only one administrator was able to make changes to HP Openview.	Although the administrator was contacted, they were not on-call which increased difficulty.	None
4. Applications were unavailable and it was unclear how they were supported after hours. It was unclear whether applications such as EMRS and MRIS had after hours support.	If an application is required to have after hours support, it must be well documented. If not, it should not take time away from supporting more critical issues.	None
5. Users were unable to access H drive.	Without H drive reports, ASOS Communications Method report could not be completed and disseminated.	None

National Weather Service Telecommunications Gateway (NWSTG)

NWSTG Transition Approach to IDP

Status: November 1, 2016



Step 1: Transition NWSTG Silver Spring, MD, software applications to IDP College Park, MD

Step 2: Enable NWSTG software application to run at IDP College Park, MD, or IDP Boulder, CO, providing 100% backup capabilities by end of December 2016.

- ✓ Two applications/services are retired: Weather.Noaa.Gov & TGDATA
- ✓ Family of Services (FOS) retired on October 3, 2016

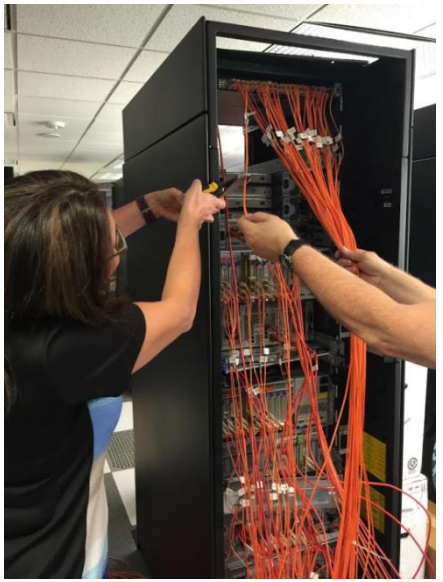
Step 3: Retire NWSTG Silver Spring, MD

IDP – NWSTG Re-Architecture

Core Switch Transition to Boulder

NWSTG Re-Architecture Project Scope: Migrate functions from the Legacy NWSTG Silver Spring, MD and Fairmont, WV facilities to the IDP operational infrastructure located in College Park, MD and Boulder, CO.

- ✓ Step 1 – Migrate Core Switch System from Legacy NWSTG facility in Fairmont, WV and operationalize in IDP-College Park. (COMPLETE)
- ❑ Step 2 – Migrate Core Switch System from Legacy NWSTG facility in Silver Spring, MD and operationalize in IDP-Boulder. (In Progress)
- ❑ Step 3 – Retire Legacy NWSTG (In Progress)



On October 18, 2016, NWS began the physical migration of the NWSTG Core Switching system from NWS Headquarters (HQ) in Silver Spring, MD to the IDP facility located at the David Skaggs Research Center (DSRC) in Boulder, CO.

The migration of the Core Switch system represents the final phase of a multi-year NWS effort to provide a long-term, sustainable, 100% backup capability for NWSTG services. The migration is expected to last approximately seven weeks with an anticipated completion date of December 9, 2016.

IDP Escalation Procedures

Reporting / Escalation Procedures

301-713-0902 / TOC.nwstg@noaa.gov or SDM@noaa.gov

Ben Kyger, NCO Director,

Ben.Kyger@noaa.gov

- 24x7 Tier I coverage ranging from 6 – 12 team members on shift at any one time for operational monitoring of critical NWS systems, applications, and data
- If multiple calls are received at the same time…calls are automatically transferred to another staffed desk
- Once an issue is reported, a ticket is opened immediately for tracking purposes and Tier II staff is contacted within minutes based on Standard Operating Procedures

Common Alert Protocol (CAP)

Common Alerting Protocol (CAP) Update

Phase 1 – Post-Processed CAP

Common Alerting Protocol (CAP) is a International XML based standard for representing alert messages in a digital format:

- NWS produces "post-processed" CAP watch/warnings and advisories alerts

The current NWS alerts in CAP version 1.2 are produced by parsing WMO/Text products and disseminated via a number of channels:

- Internet file services
- NOAAport
- FEMA IPAWS

This "post-processed" method is a stop gap approach for support of the FEMA/IPAWS Wireless Emergency Alerts channel, a permanent CAP origination capability will be implemented in AWIPS Hazards Services

- There are known data/message defects in some current CAP feeds:
  - Caused by incorrect formatting
  - Caused by non-optimal formatting process
  - Defects do not impact Wireless Emergency Alerts mission

What is "Common Alerting Protocol"?

- The Common Alerting Protocol (CAP) is a digital format for exchanging emergency alerts that allows a consistent alert message to be disseminated simultaneously over many different communications systems.
- The National Weather Service (NWS) uses a form of CAP to receive Non-Weather Emergency Messages (NWEMs) from authorized public officials for relay over its family dissemination systems, including NOAA Weather Radio.
- NWS also uses CAP to relay NWS originated warnings via IPAWS.

Corrections for these known data/message defects will be implemented by FY17 Q3.

Common Alerting Protocol (CAP) v.1.2

Issues / Bugs – Status Report

Issue	Impact	Level of Effort	Status
1. WMO Products and headlines are not parsed correctly and/or data is missing in output	Results in over warning for some Flash Floods and fails to align the header to the watch / warning / advisory information in the body of the product (IBM/TWC issue)	80 hours / IRIS & HCE	**Fixed (8/22/16)**
2. CAP message does not properly display precautionary / preparedness information that is listed in the WMO message	CAP has missing or incorrectly placed product content (IBM/TWC issue)	40 hours / IRIS decoder and HCE	**Fixed (9/19/16)**
3. Duplication of messages on EAS if warning is received at EAS broadcast station via both NWR and IPAWS CAP Message	Multiple messages are sent for the same watch, warning, advisory (FEMA issue)	Test first to determine LOE	**In Progress (FEMA)**
4. Alerts are not distributed or are inadequately distributed for some watch, warning, advisories that have multi-line VTEC codes	Affects mostly hydro products but has occurred with dust storms, winter weather, tropical, and heat-related products	40 hours/ IRIS decoder	**Testing expected 12/16**

Common Alerting Protocol (CAP) v.1.2

Issues / Bugs – Status Report

Issue	Impact	Level of Effort	Status
5. CAP output is not generated for some OCONUS and NCEP products. Not all information is contained in the product as expected by the IRIS Decoder	Affects tsunami products, hurricane local statements, Alaska Region WFO products. Note: hard-coded fix implemented for NTWC and PTWC	40 hours/ IRIS	**HLS fixed (9/19/16) TSU expected 2/17**
6. During the process to add WMO headers to the CAP messages, the processing fails resulting in messages failing to be disseminated	When the process to add WMO headers fails, the CAP messages are not written to TGFTP and are not sent to NOAAport. This does not impact IPAWS.	40 hours / HCE	**Fixed (9/19/16)**
7. CAP messages for Tsunami Warnings may have missing fields due to non-standard formatting of the original WMO message	Tsunami watch/warning CAP messages affect WEA users only. CAP does not include description and instruction elements for other users.	16-40 hours / IRIS	**Expected 2/17**
8. The CAP messages do not contain all the WMO-formatted parameter elements	Customers are not able to always reproduce headlines and other data currently in the WMO products from CAP v1.2	120 hours / IRIS & HCE	**Expected 2/17**

Common Alerting Protocol (CAP) Update

Phase 2 – Hazards Services Generated CAP

Hazard Services

- Produce Hydrologic related hazards using a new framework that replaces the capabilities that reside in WarnGen , GHG, and RiverPro
- Implement new capabilities to better generate hazards (e.g., recommenders)

Benefits/Highlights:

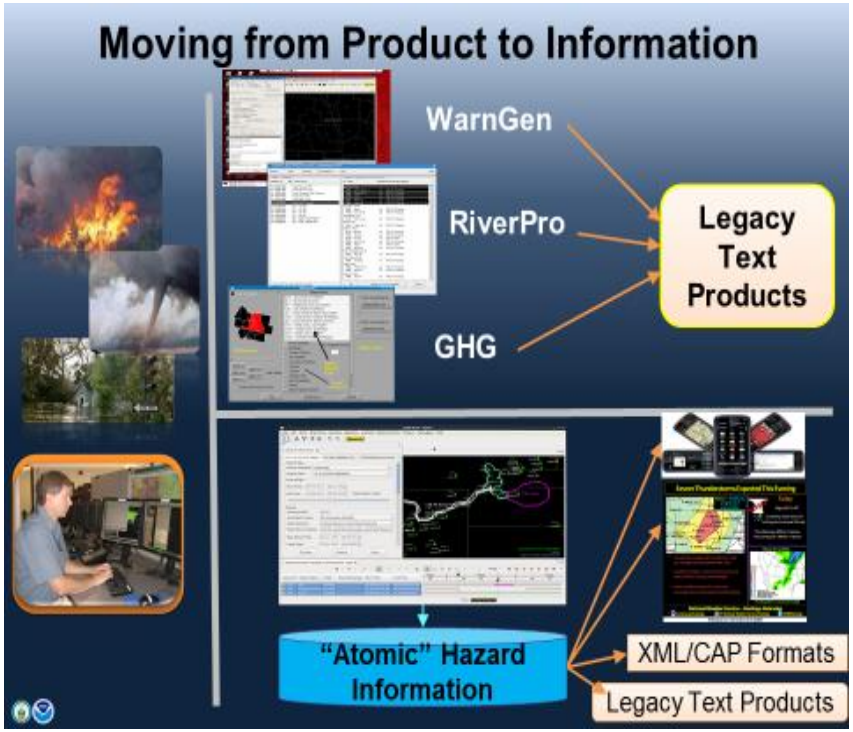
- Streamlines the hydro warning process within the forecast office
- Enables modern communications protocol (e.g., CAP, XML, etc.), and future capabilities (e.g., Probabilistic Hazards, Hazard simplification)
- Reduces the cost of O&M for the watch, warning and advisory applications

Hazard Services Tentative Schedule

- Framework and Hydrologic Products deployment in 2019
- Remaining Products between 2019 and 2020

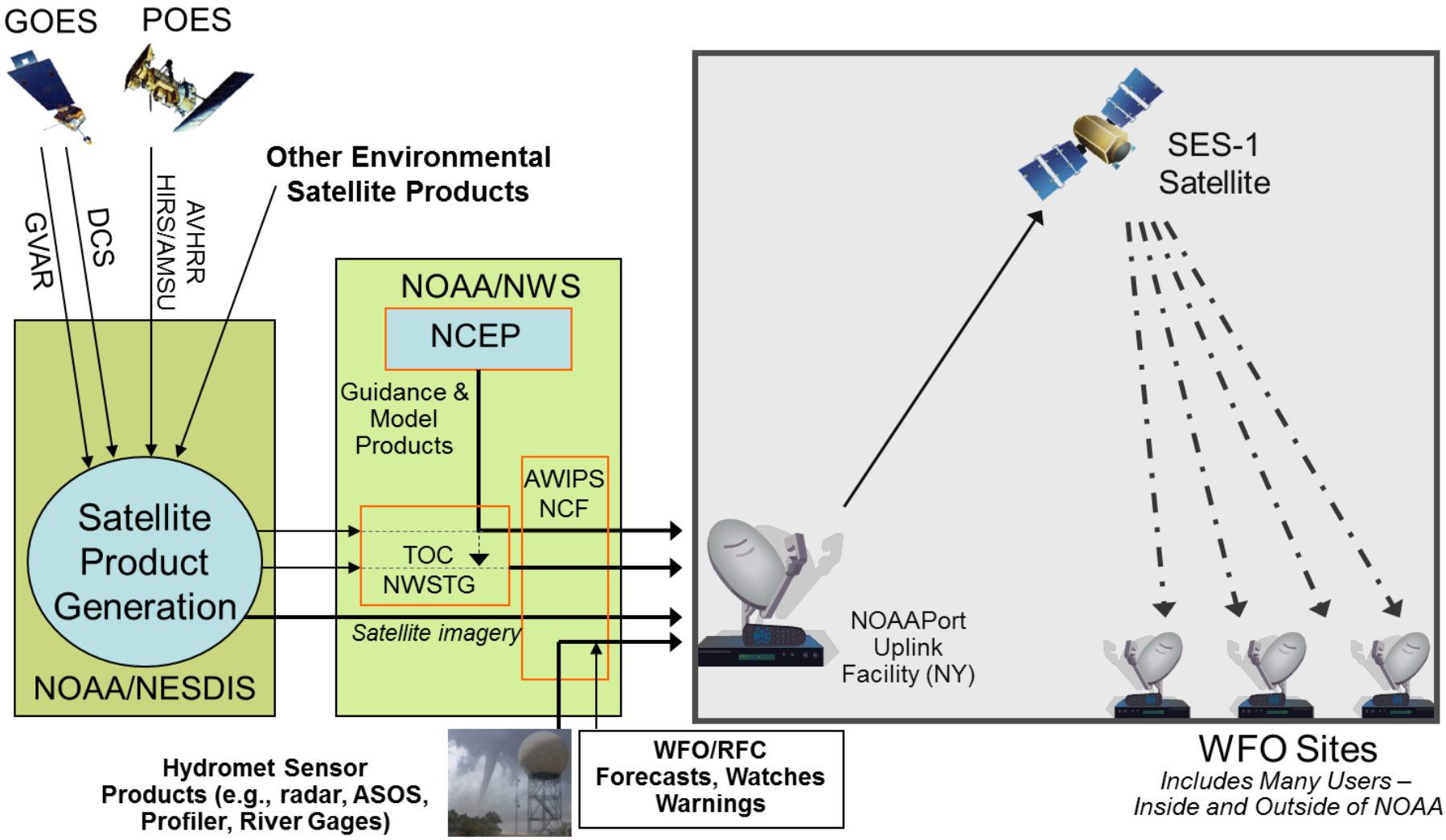
Potential Transition to Hazard Services CAP messages

- Hydrologic products in 2019
- Remaining watches and warnings in 2020
- Decommissioning of the “post processing” method in 2021

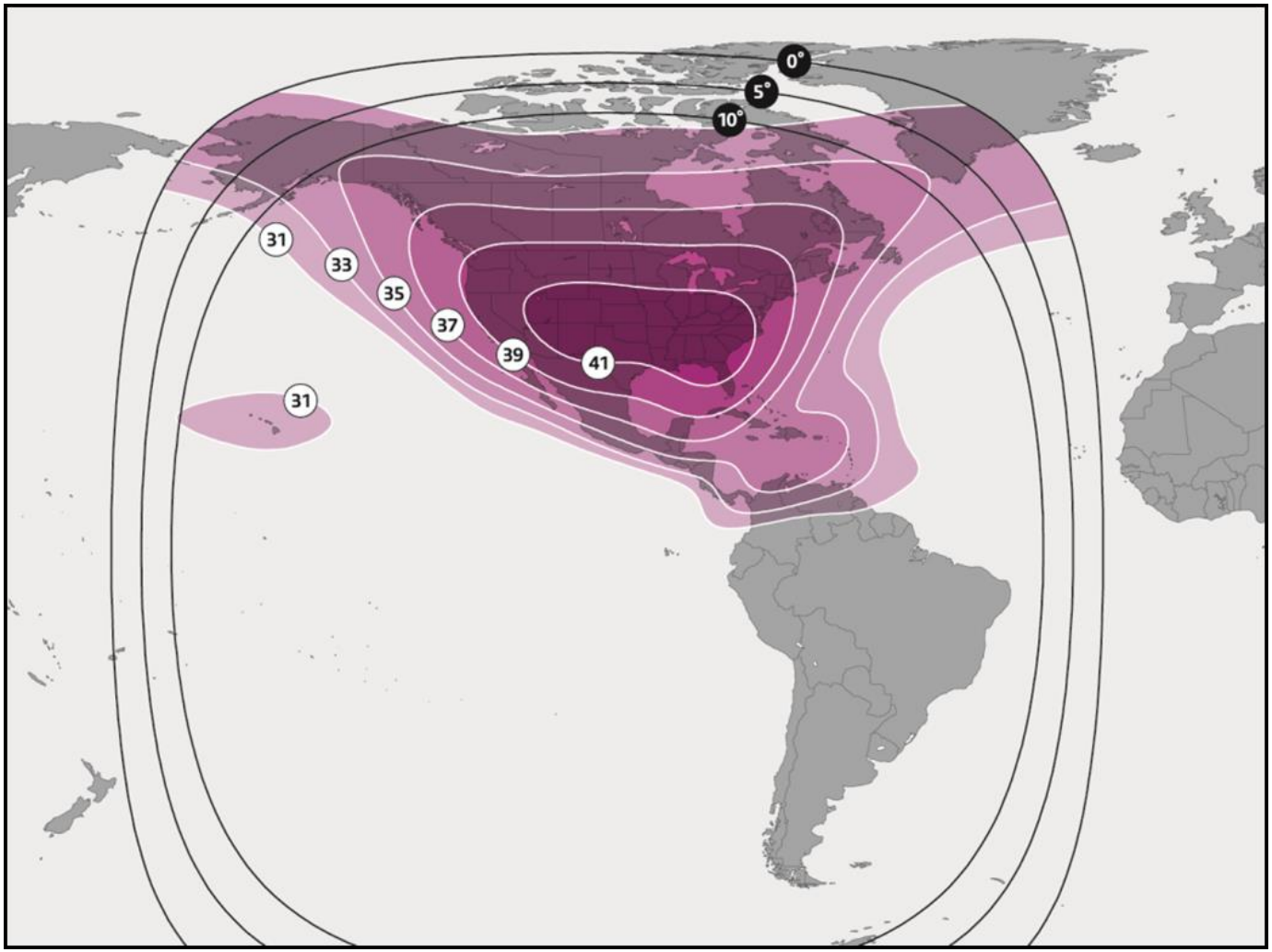


NOAAPort / SBN Update

SBN/NOAAPort
Network Overview



SBN/NOAAPort
Approximate Coverage Area



Satellite: SES-1

Location: 101W

C-Band

Launch Date:
April 2010

Life Expectancy:
15 Years

SBN/NOAAPort
Channels

NOAAPort Channels - There are currently five operational NOAAPort data streams serving AWIPS, each with a unique DVB PID:

- NCEP/NWSTG (NMC – PID 101)
- GOES/NESDIS (GOES – PID 102)
- NCEP/NWSTG2 (NMC2 – PID 103)
- OCONUS Imagery/Model/DCP (NOPT – PID 104)
- NPP (POLARSAT – PID 105)

NOAAPort Experimental & GOES-R channels

- Experimental (EXP – PID 106)
- GOES-R Series (GRW – PID 107)
- GOES-R Series (GRE – PID 108)

SBN/NOAAPort
Network Expansion

- Increased the SBN Bandwidth from 30Mbps to 65+Mbps
- NOAAPort Channel Resizing – to support the new product additions.
- The SBN expansion project is coordinating with other AWIPS and IDP projects, focused on upgrading the terrestrial networks that feed the SBN – OneNWS Network
- Main drivers for expansion are GOES-R, JPSS, NCEP and other gridded-guidance analysis/forecast products.

SBN/NOAAPort
Product Types

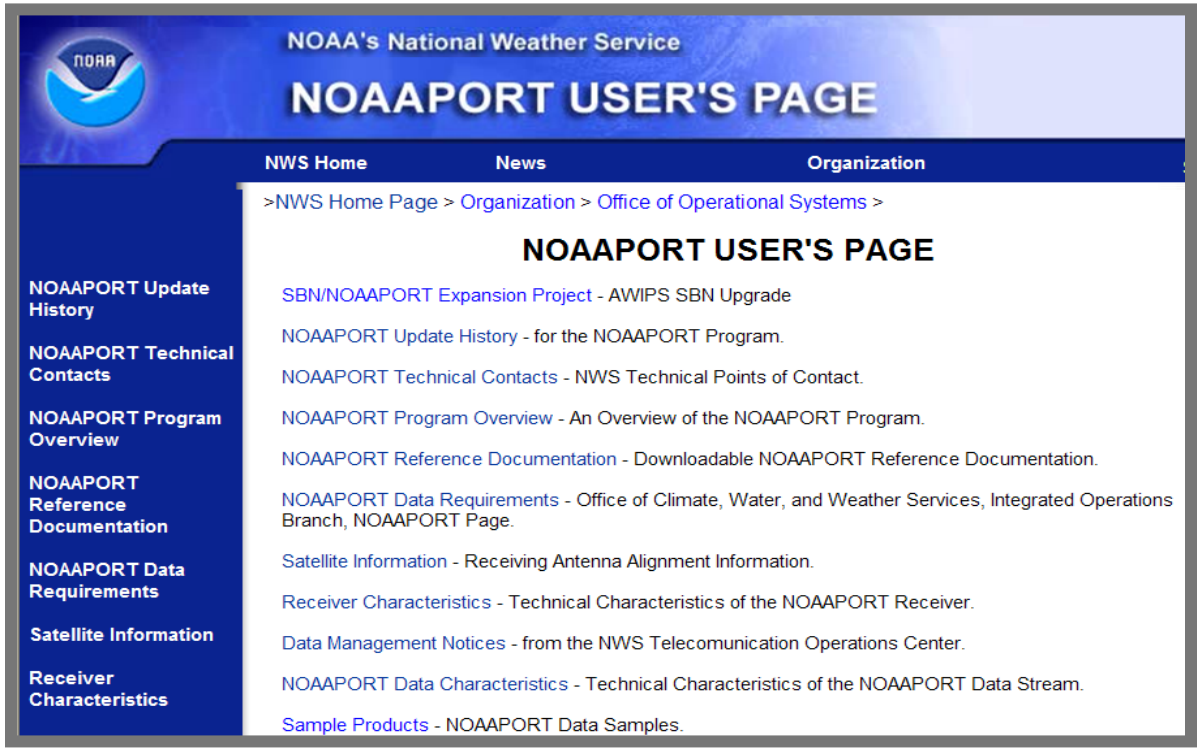
- High-Resolution Rapid Refresh (HRRR) model data, Multi-Radar Multi-Sensor (MRMS) data and other various products

- GOES-R Test Data: 2015 through 2016

- GOES-R Series and JPSS Products: 2016 and beyond

- New NCEP Model Products

SBN/NOAAPort
Reference and Contact Information



http://www.nws.noaa.gov/noaaport/html/noaaport.shtml

NOAAPort Contacts

Data and Products: ***nws.hq.ops31.dm@noaa.gov***

Engineering/Technical: ***nws.noaaport.support@noaa.gov***

IDP Web/GIS Dissemination Services

Available IDP Dissemination Services
IDP Web and Geospatial Services (GIS)

- **Standup and Maintain an Enterprise GIS Infrastructure**
  - Leveraging web services and GIS to disseminate NOAA and NWS critical data to forecasters, NOAA users, Federal partners (Federal Aviation Administration (FAA) and Federal Emergency Management Agency (FEMA)), International community and public
  - Implementing net-centric weather information dissemination capability to fulfill NWS' role for the Next Generation Air Traffic System (NextGen)
  - Onboarding current GIS capabilities onto operational dissemination infrastructure
  - Establishing common format framework for providing GIS data sets

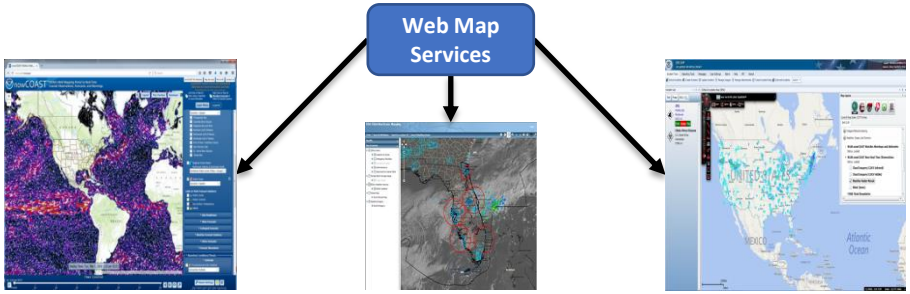
- **Establishing consistent metadata and a consolidated catalog for discovery and access of NOAA and NWS geospatial content**

Available IDP Dissemination Services
IDP GIS – nowcoast.noaa.gov

As of September 30, 2016, nowCOAST is providing access to the NHC Potential Storm Surge Flooding Map

- NOAA's nowCOAST (nowcoast.noaa.gov) is now providing access to the NWS/National Hurricane Center Potential Storm Surge Flooding Map via web mapping services (official announcement here).
- Users can access the Potential Storm Surge Flooding Map using two different protocols: ArcGIS Representational State Transfer (REST) Map Service and OGC Web Map Service (WMS).
- This service will allow NOAA users to integrate this map with their own map layers such as coastal evacuation routes and critical infrastructure on client- or server-based Geographic Information Systems or other mapping applications.
- In addition, users will also be able to view the NHC map via the nowCOAST map viewer. This new nowCOAST map service can be found at:

http://nowcoast.noaa.gov/arcgis/rest/services/nowcoast/wwa_meteocean_tropicalcyclones_inundation/MapServer

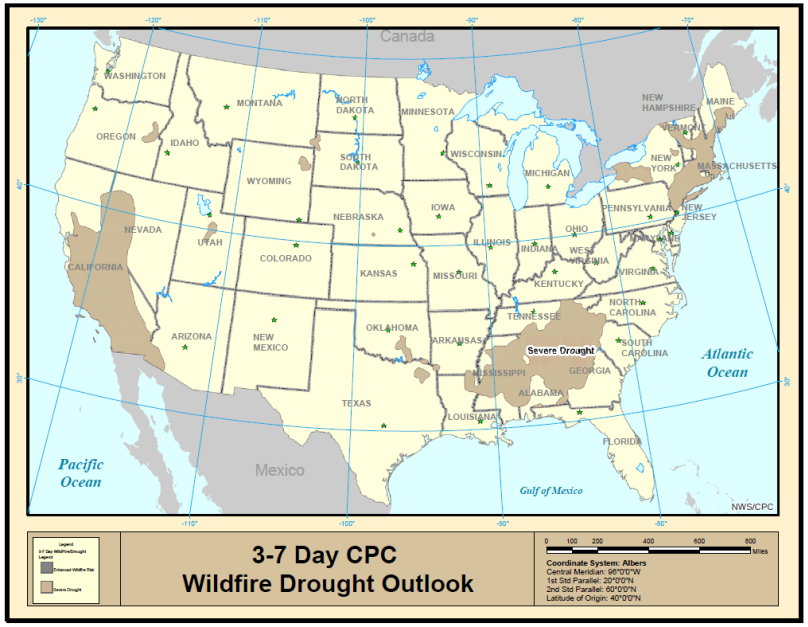


nowCOAST Map Viewer | Fifth Third Bank Map Viewer | U.S. DHS COP Viewer

Planned IDP Dissemination Services
IDP Web and Geospatial Services (GIS)

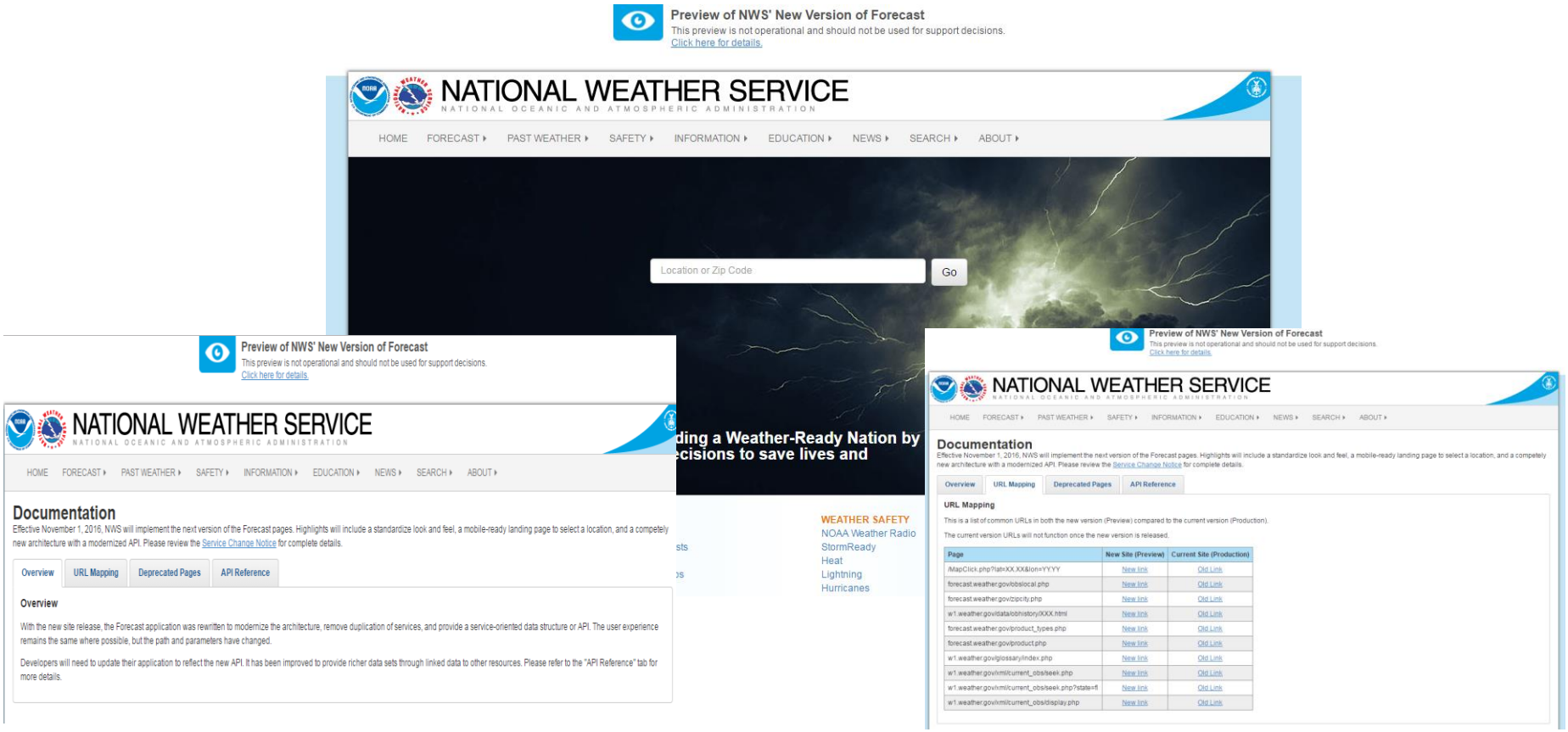
- **Q1 FY17 Web Map Services (WMS)**
  - Climate Prediction Center (CPC) Wildfire/Drought Outlook
  - CPC Temperature Outlook
  - CPC Precipitation Outlook
  - Weather Prediction Center QPF (updated)

- **Q2 FY17 Web Map Services**
  - NDGD Air Quality
  - RFC Hourly QPE
  - RFC Flash Flood Guidance
  - NOHRSC
  - WPC Snow Probabilities



Forecast.Weather.Gov

- **Soliciting Comments through Nov 15, 2016: https://forecast-v3.weather.gov**
- **Public Information Statement: http://www.nws.noaa.gov/os/notification/pns16-35forecastgov.htm**



Upcoming
MRMS & MADIS Releases

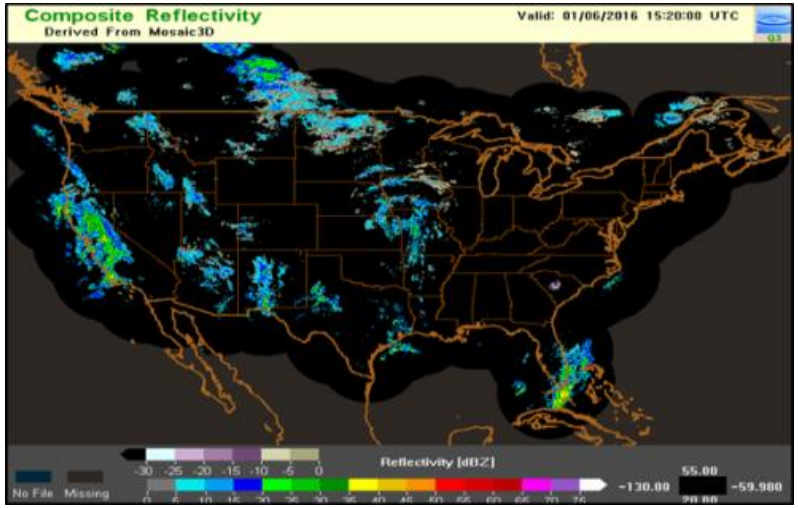
MRMS Upcoming Releases on IDP

MRMS v11.0.0 (November 2016)

The MRMS system was developed to produce severe weather and precipitation products for improved decision-making capability for severe weather forecasts and warnings, hydrology, aviation, and numerical weather prediction.

Additions and updates for v11.0.0 include:

- infrastructure efficiencies
- lightning product enhancements
- improved gauge data ingest and quality control
- RIDGE2 support
- MDL's AutoNowCaster



Partners can request a subscription service to MRMS, via LDM, at any time.

Have a question or need help getting started?
Send an email to ncep.list.idp_support@noaa.gov with the subject line "MRMS LDM request".

Versions 11.5.0 (FY17 Q2) and 12.0.0 (FY17 Q4) are planned for next year.

MADIS Upcoming Releases on IDP

MADIS v2.1.5 (December 2016) – Partial *Clarus* functionality

MADIS is a meteorological observational database and data delivery system that provides observations that cover the globe. Archive capabilities provided by the National Environmental Satellite, Data, and Information Service's National Climatic Data Center (NCDC).

- Clarus is a research and development initiative to demonstrate and evaluate the value of "Anytime, Anywhere Road Weather Information" provided by both public agencies and the private weather enterprise to transportation users and operators. Federal Highway Administration (FHWA), NWS, and the Office of Oceanic and Atmospheric Research (OAR) agreed that MADIS should become the operational home for Clarus.

- Version 2.1.5 also includes HADS and SNOTEL processing migrated from the Telecommunications Gateway.

Partners can request a subscription service to MADIS, via LDM, at any time.

Have a question or need help getting started? Send an email to madis-support@noaa.gov with the subject line "Clarus transition".

NOAA Weather Radio (NWR)

NOAA Weather Radio (NWR)

Current Activities and Future Transformational Change of Weather Information Mass Dissemination

Transition NWR Operations to BMH

- **Completed the development and deployment of the Broadcast Message Handler (BMH).**
- BMH – an enterprise based application replaces the aged and obsolete NOAA Weather Radio (NWR) Console Replacement System (CRS).
- BMH functionality meets and exceeds the functionality of the CRS and provides a scalable environment for implementing future improvements and upgrades.

NWR Transmitter Refurbishments

- The final six "Tube Technology" transmitters are underway for Solid State replacement which will complete this obsolete technology upgrade.
- The Solid State technology allows the site Preventative Maintenance Interval to be extended 3-fold and increases the equipment Mean-Time-Between-Failures (MTBF) by five-fold.
- **NEXT STEPS:** current "analog" audio telecommunication connections between Weather Forecast Offices and transmitter sites will be upgraded to IP based connections and wireless technologies, where possible.

Transformational Change

- **Phase I (FY16) Stakeholder Engagement**
  [Social science methods included in-person interviews, surveys, and focus group sessions]
- Identification and classification of over 200 key stakeholders
- Completion of over 25 engagement activities (within 60 days) with stakeholder representatives from: Broadcasting, Emergency Management, Consumer Manufacturers, Mobile Tech Industry, and Gov
- **Phase II (FY 17-18) Design & Engineering** – Stakeholder needs analysis inputs reviewed and prioritized for requirements process and product/project life cycle implementation.

THANK YOU!

NOAAPort
Network Expansion

Parameter	Current Configuration
NWS Field Node Dish Diameter	
• **CONUS, excluding fringe**	• Two sizes: 3.7 and 3.8 meters
• **CONUS, fringe**	• 4.5 meters
• **Alaska, Hawaii, and Puerto Rico**	• 7.3 meters
Uplink Dish Size (MGS – Hauppauge, NY)	9.3 meters
Uplink Dish Size (BMGS – Fairmont, WV)	7.3 meters

NOAAPort
Network Expansion

Parameter	Before Expansion	After Expansion
System	DVB-S2	DVB-S2
Data Rate	30 Mbps	65 Mbps (full transponder)
Modulation / Coding	8PSK 2/3	16APSK 3/4
Satellite	SES-1	SES-1
RF Downlink Frequency (C-Band)	3995.85 Mhz	4040.0Mhz
RF Frequency (L-Band)	1154.15 Mhz	1110.0Mhz
Input Stream Identifier (ISI)	13	19
PID(s)	101, 102, 103, 104, 105, 106, 107, 108	
Uplink Site / Master Ground Station	Hauppauge, NY	
Backup Master Ground Station	Fairmont, WV	