National Weather Service

Terminal Doppler Weather Radar (TDWR) Supplemental Product Generator (SPG)

September 3, 2020
The SPG is a Supplemental Product Generator System developed to convert the FAA Terminal Doppler Weather Radar (TDWR) Products into Weather products for the local WFO.

The TDWR data can be used by Weather Forecasters to provide more information on Severe Weather events.
Terminal Doppler Weather Radars (TDWR) are FAA C band radars located near 45 major airports. These radars are connected to 34 NWS Weather Forecast Offices (WFOs) near the TDWRs. Some WFOs have multiple TDWR connections. TDWRs are designed for wind shear, gust fronts and turbulent weather near the airport.
Some of the differences between TDWR and NEXRAD systems are:

- TDWR has clearer display resolution
- TDWR has more attenuation: C band (5.8 – 6.2 GHz) vs. NEXRAD S band (2.7 – 3.0 GHz)
- TDWR has no NWS operator control. FAA controls the TDWR.
- TDWR has less coverage area - Short range (90 km) and Long range (460 km)
System Information

- SPG’s HCI is very similar to RPG’s HCI with fewer interface buttons.
- TDWR broadcasts in UDP.
- Uses two VCPs: 90 (Monitor) and 80 (Hazardous). Both are 6 minute VCPs.
- Hazardous mode uses two mini-volume scans. Lowest elevation scan is updated once a minute.
- Elevation angles are site specific
TDWR Weather Products are sent to the National Level II servers and to the local AWIPS Display System through the One NWSNet WAN.

SPG uses Red Hat 7.0 Linux as the current Operating System. The SPG Software is CPCI-86.

SPG System is configuration managed by the ROC. The SPG Hardware is UD55.
TDWR VCP 90 (Monitor)

Monitor Mode Scan Strategy at BWI TDWR

- Antenna Elevation (Degrees)
- Elevation Index
- Long Range
- Short Range

Graph showing the monitor mode scan strategy with points indicating antenna elevation and elevation index.
TDWR VCP 80 (Hazardous)
TELCO Information

- T1 connection is a Private Leased T1 circuit
- B8ZS coding
- The NWS TELCO Channel Service Units (CSUs) are installed at the TDWR and WFO locations for bridging the signal from Ethernet to T1.
- FAA uses UDP format. ROC is developing a UDP to TCP converter to help improve data transmission reliability.
SPG Data Overview

- NCEI
- Other Gov Users
- Academia
- Pvt Sect

SPG at 34 NWS WFOs

LOCAL AWIPS (AWIPS & WMO Headers Added)

RFN AWIPS

NWS National Centers

45 FAA Terminal Doppler Weather Radars

45 FAA Terminal Doppler Weather Radars

Level II Products

Level III

T1

NWS Network

Silver Spring SSMC2

National Level II Servers

College Park/Boulder NCO/RPCCDS

-AICE
-Other Gov Users
-Academia
-Pvt Sect

AWIPS NCF

AWIPS SBN

Level II

-FAA
-Other

AWIPS & WMO Headers Added
**SPG Data Path**

- 45 FAA TDWR radars generate Level II & Level III
- ROC maintains & supports T1 circuits transporting the data from 45 FAA TDWRs to SPG servers at 34 NWS WFOs
- SPG Level III products are sent via local WFO AWIPS to the AWIPS NCF (Silver Spring SSMC2) and then to the Radar Product Central Collection Dissemination Service (RPCCDS), NCEP College Park, MD
- Level III is a subset of the products that a local AWIPS obtains from the SPG with an AWIPS & WMO header added.
- SPG Level II is transmitted on the One NWSNet Enterprise VRF as ‘NEXRAD2’ data” and not via AWIPS.
- SPG Level II is sent to NL2 collection and distribution servers located in Silver Spring, VA and the ROC, in Norman, OK.
SPG Hardware

- WFO has the following NWS components:
  - 1 Rack Unit (RU) Processor (Site specific)
  - KVM switch for operator interface with the processor.
  - RICI-T1 Unit to bridge the incoming T1 signal to Ethernet.
  - Power Distribution Unit (PDU)
  - SPG KVM Extender equipment to allow WFO Operations floor personnel non-local access to the SPG KVM switch.
TDWR has the following NWS components:

- RICI-T1 Unit to bridge the outgoing T1 signal to Ethernet.
- Power Distribution Unit (PDU)
TDWR Strengths

- Reduces the “Cone of silence” – Another radar in the WFO’s vicinity
- More lower volume coverage scans during severe weather (VCP 80). Lowest elevation is scanned every minute.
- Higher resolution
TDWR Limitations

- Higher attenuation can lead to misleading data
- Missing radials
- TELCO problems with LAN equipment at the TDWR
- Limited access to the TDWR shelter
System Information

- System Name: Terminal Doppler Weather Radar (TDWR) Supplemental Product Generator (SPG)
- System Number: NOAA8212
- Type of System: General Support System
- System Description:
  - Fully deployed at 34 WFOs with 45 TDWRs (e.g. Silver Spring has 4 SPGs)
  - Produces data from all 45 FAA TDWRS and provides additional Doppler weather radar data with low altitude updates
  - Data used only by local weather forecast offices to add to the overall confidence of data observed with primary NWS systems and to compliment other NWS radar and sensor information
Questions and Comments