Integrated Terminal Weather System (ITWS)

Friends/Partners in Aviation Weather

Orlando, Florida
October 9, 2008

Presented by: Benn Deans
FAA Weather Processors Manager
ITWS Program Description

- Provides air traffic managers and controllers current and forecasts (up to 60 minutes) of terminal weather
- Accurate, easy-to-understand, and immediately useable graphical weather information on a single color display for decision support, collaboration, and common situational awareness
- Uses sophisticated algorithms to integrate data from FAA and NWS sensors, radars, and weather models, and from aircraft in flight
- Used at TRACONs, towers, ARTCCs and the Command Center, and by the airlines, during adverse weather
- Authorized FAA and non-FAA users have internet access to ITWS products via the External User 2 website
Integrated Terminal Weather System (ITWS)

ITWS Real-Time Processor

ASR
TDWR
NEXRAD
Pilots

1-hr Forecast
Microburst Prediction
Gust Front Prediction
Storm Location & Motion
Storm Cell Information
Terminal Winds
Tornado

Controllers

AWOS/ASOS

1-hr Forecast
Microburst Prediction
Gust Front Prediction
Storm Location & Motion
Storm Cell Information
Terminal Winds
Tornado

Supervisors
- TRACON
- ARTCC TMU
- CWSU

Airlines
- Dispatch
- Ramp Tower

Aircraft (MDCRS)

Lightning

LLWAS

RUC

Federal Aviation Administration
Friends/Partners in Aviation Weather Briefing
October 9, 2008
ITWS Products

- **Wind shear products**
  - Microburst detection/prediction
  - Gust front detection/forecast
  - Wind shift estimate
  - Timers

- **Storm Products**
  - Precipitation
  - Storm Cell Information
    - Hail
    - Echo Tops
    - Lightning
    - Mesocyclone
    - Severe Storm Circulation
  - Storm Motion
  - Storm Extrapolated Position

- **Terminal Convective Weather Forecast (TCWF)**
  - Standard 1 hour forecast
  - Winter 1 hour forecast
  - Forecast quality metrics

- **Other**
  - ASR-9/11 AP editing
  - Tornado signature detection/alert
  - Airport lightning warning
  - Terminal winds profile
  - Pilot text/character graphics message
### ITWS Waterfall - Working Schedule

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Raytheon Test Bed 02/02" /></td>
<td><img src="image" alt="WJHTC 04/02" /></td>
<td><img src="image" alt="PSF 08/02" /></td>
<td><img src="image" alt="FAAAC 08/02" /></td>
<td><img src="image" alt="Atlanta 10/27/2003" /></td>
<td><img src="image" alt="Kansas City 04/10/2003" /></td>
<td><img src="image" alt="Chicago 10/20/2003" /></td>
<td><img src="image" alt="New York 11/15/06" /></td>
<td><img src="image" alt="Indianapolis 1/2009" /></td>
</tr>
<tr>
<td><img src="image" alt="Las Vegas OEP 3/2009" /></td>
<td><img src="image" alt="New Orleans 3/2009" /></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Miami 12/04/2003" /></td>
<td><img src="image" alt="St Louis 12/10/2003" /></td>
<td><img src="image" alt="Minneapolis 01/04/2005" /></td>
<td><img src="image" alt="Boston 01/13/2005" /></td>
<td><img src="image" alt="Pittsburgh 10/19/2007" /></td>
<td><img src="image" alt="Cincinnati 10/22/2007" /></td>
<td><img src="image" alt="Salt Lake City 02/29/2008" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Detroit 1/9/2008" /></td>
<td><img src="image" alt="Phoenix 01/11/2008" /></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Philadelphia 03/15/2008" /></td>
<td><img src="image" alt="Cleveland 04/29/2008" /></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As of 8/12/2008</td>
<td>ITWS Support Systems Installed</td>
<td>Projected Installation/CAI Date</td>
<td>Installed/CAI Complete</td>
<td>Commissioned</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ITWS External User Website at the Volpe Center
(Managed by the ITWS Program Support Facility (PSF) in Oklahoma City)

AWOS, ASOS, TDWR, RUC, ASR-9/11, LLWAS, NEXRAD, Lightning, MDCRS (from Aircraft)

FAA TRACON

ITWS Product Generator

TCP/IP Server Software

FAA Network

ITWS Digital Data Distributor

Pool: EAST
Graphics Generator & Web Server

Pool: SOUTH
Graphics Generator & Web Server

Pool: WEST
Graphics Generator & Web Server

Pool: CENTRAL
Graphics Generator & Web Server

Loadbalancer

Firewall

Client at FAA, Air Carrier, or Other

ITWS data

Leased Circuit or other

ITWS data as HTML and images

Web browser at FAA, Air Carrier, or Other

Friends/Partners in Aviation Weather Briefing
October 9, 2008

Federal Aviation Administration
Features of the ITWS External User Website
(CURRENTLY OPERATIONAL AT THE VOLPE CENTER)

• What does ITWS Website provide?
  – ITWS Weather Products for any or all of the ITWS-supported airports (selected by user while logged into the Website)
• ITWS weather products currently available for the following airports:
  Atlanta, Miami, Ft. Lauderdale, West Palm Beach (FL), Kansas City, Springfield (MO), St. Louis, Houston (IAH & HOU), Chicago (ORD & MDW), Milwaukee, Washington DC (DCA, IAD, & ADW), Baltimore, Boston, Charlotte, Denver, Minneapolis, New York (JFK & LGA), Newark, Teterboro (NJ), Dallas (DFW & DAL), Orlando, Daytona Beach (FL), Tampa, Memphis, Detroit, Cincinnati (CVG), Pittsburgh, Phoenix, Philadelphia, Salt Lake City, Cleveland
• ITWS products to be available for the following airports by the middle of CY2010:
  Indianapolis, Las Vegas, New Orleans, Nashville, Columbus, Dayton, Raleigh-Durham, Oklahoma City, Wichita, Louisville, Tulsa, San Juan, Little Rock (AR), Jackson (MS)
• ITWS products planned for the following Secondary Reliever Airports (SRAs) by the end of CY2010:
  Lafayette Regional (LA), Akron-Canton Regional (OH), Laurence G. Hanscom Field (MA), Manchester (NH), Theodore Francis Green (RI), Southwest Florida Intl (FL), Orlando-Sanford (FL), Chicago (IL), Capital City (MI), City of Colorado Springs Municipal (CO), St. Paul Downtown Holman Field (MN), Dekalb-Peachtree (GA), Columbia Metropolitan (SC), Charles B. Wheeler Downtown (MO), St. Louis Downtown (MO), Spirit of St. Louis (MO)
Features of the ITWS Website (Cont’d)

- Who currently uses the ITWS Website?
  - FAA Command Center (Herndon, VA), Airlines, Airport Authorities, Aviation Industry System Developers

- How does a potential non-FAA external user gain access to the Website?
  - Must sign a Memorandum of Agreement (MOA) with the FAA
  - Must establish dedicated telecom line to ITWS Website via commercial service provider:
    - Guidance given in Volpe Center document ‘Technical Considerations for ITWS Website Connection’
    - Contact Volpe Center ITWS Website Program Office for specific guidance
Federal Aviation Administration

Friends/Partners in Aviation Weather Briefing
October 9, 2008

Major Airline Users of ITWS Weather Products via Volpe Web

<table>
<thead>
<tr>
<th>ITWS Website (Volpe) External User Wx Product Requests (per Hour) During Severe Wx Event</th>
<th>Requests Per Hour</th>
<th>No. of ITWS Airports</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAA Command Center</td>
<td>4213</td>
<td>(9 Airports)</td>
</tr>
<tr>
<td>Delta Airlines</td>
<td>7032</td>
<td>(4 Airports)</td>
</tr>
<tr>
<td>Fed Ex</td>
<td>1625</td>
<td>(3 Airports)</td>
</tr>
<tr>
<td>Continental Airlines</td>
<td>1415</td>
<td>(2 Airports)</td>
</tr>
<tr>
<td>Northwest Airlines</td>
<td>1109</td>
<td>(5 Airports)</td>
</tr>
</tbody>
</table>

LEGEND
- ITWS TRACON Site (Baseline 22)
- Last 11 ITWS Site
- Volpe Center
- Volpe Center ITWS Users
ITWS SWIM Segment One

• SWIM (System Wide Information Management) is the FAA’s implementation of a Service Oriented Architecture (SOA) environment
  – The FAA is transitioning toward publish/subscribe technology
• ITWS is a key component of SWIM Segment One
  – ITWS requirements, schedule and funding included in the SWIM Segment One baseline
  – ITWS project endorsed by JPDO, Weather COI and NAS Architecture
• Plan to establish external access to all ITWS weather information through a SWIM interface
  – The external gateway will be located in the FAA Technical Center at Atlantic City, NJ
• ITWS SWIM Benefits:
  – SWIM provides enabling technology for future interoperability/integration of weather products and systems
    • For example, ATO-T and ATO-R are cooperating via SWIM to use the same software standards for future ITWS and CIWS projects
    • Potential cost avoidances for future integration of weather products and displays
  – Airlines want ITWS data in a format that allows them to integrate products into their weather analysis decision aid tools
ITWS SWIM Prototype

• Although ITWS SWIM Segment One is scheduled for deployment in December 2010, the ITWS SWIM prototype is available NOW
  – After performance testing is completed, a determination will be made as to how many additional users the prototype may support
  – The prototype will offer 4 ITWS weather products, from each “ITWS airport”
    • Micro Bursts; Gust Fronts; Configured Alerts; Terminal Text
• Parties interested in participating in the ITWS SWIM prototype must request application forms from the FAA (use the contact information in the SWIM.gov website)
  – Prototype participation is very limited
  – All inquiries will be documented and placed on the Segment One information distribution list
• New prototype users will require their own internet based VPN (virtual private network) to the external gateway located in the FAA Technical Center at Atlantic City, NJ
  – This same requirement will likely apply to Segment One users
• A Client Software Package and User Guide is currently being provided by the FAA to the prototype participants
Actual Screenshot of Test Transmission from Miami (MIA) ITWS to Remote User via the ITWS-SWIM Prototype
ITWS Notional SWIM-enabled Reference Architecture

FAA IP Network

Encoded Data

ATCSCC

ARTCCs

ATCTs

TRACON

ITWS PG

Public IP Network

Encoded Data

Subscribe

Airlines

Weather Vendors

DoD, DHS

Encoded Data

External Gateway

Encoded Data

Publish

Web Service changes under SWIM

SWIM Registry

SWIM Gateway Services

SWIM Core Services

VOLPE

Wx-WS
POINTS OF CONTACT

Weather Sector Processors Lead
  Benn Deans, 202-385-8603, benn.deans@faa.gov

ITWS Program Lead
  Maggie Baker, 202-385-8613, maggie.baker@faa.gov

ITWS Systems Engineering
  Ernesto Etienne, 202-385-8092, ernesto.etienne@faa.gov
  Bill Yeagley, 202-314-1293, bill.ctr.yeagley@faa.gov

ITWS Program Support Facility (PSF)
  Bettie Loudenslager, 405-954-5186, bettie.loudenslager@faa.gov

ITWS Test & Evaluation
  Tom Weiss, 609-485-6898, thomas.weiss@faa.gov

Volpe Center ITWS Website Program Manager
  Tony Colon, 617-494-2647, Tony.Colon@volpe.dot.gov

ITWS Telecommunications Lead
  Anthony Johnson, 202-314-1227, anthony.ctr.johnson@faa.gov

ITWS Logistics/Training
  Casper Cooper, 202-314-1214, casper.ctr.cooper@faa.gov
www.ato.faa.gov