

The Need and Capability of a Surveillance Data Distribution System

Dave Whitman
Sunhillo Corporation

ICNS 2009
May 15, 2009

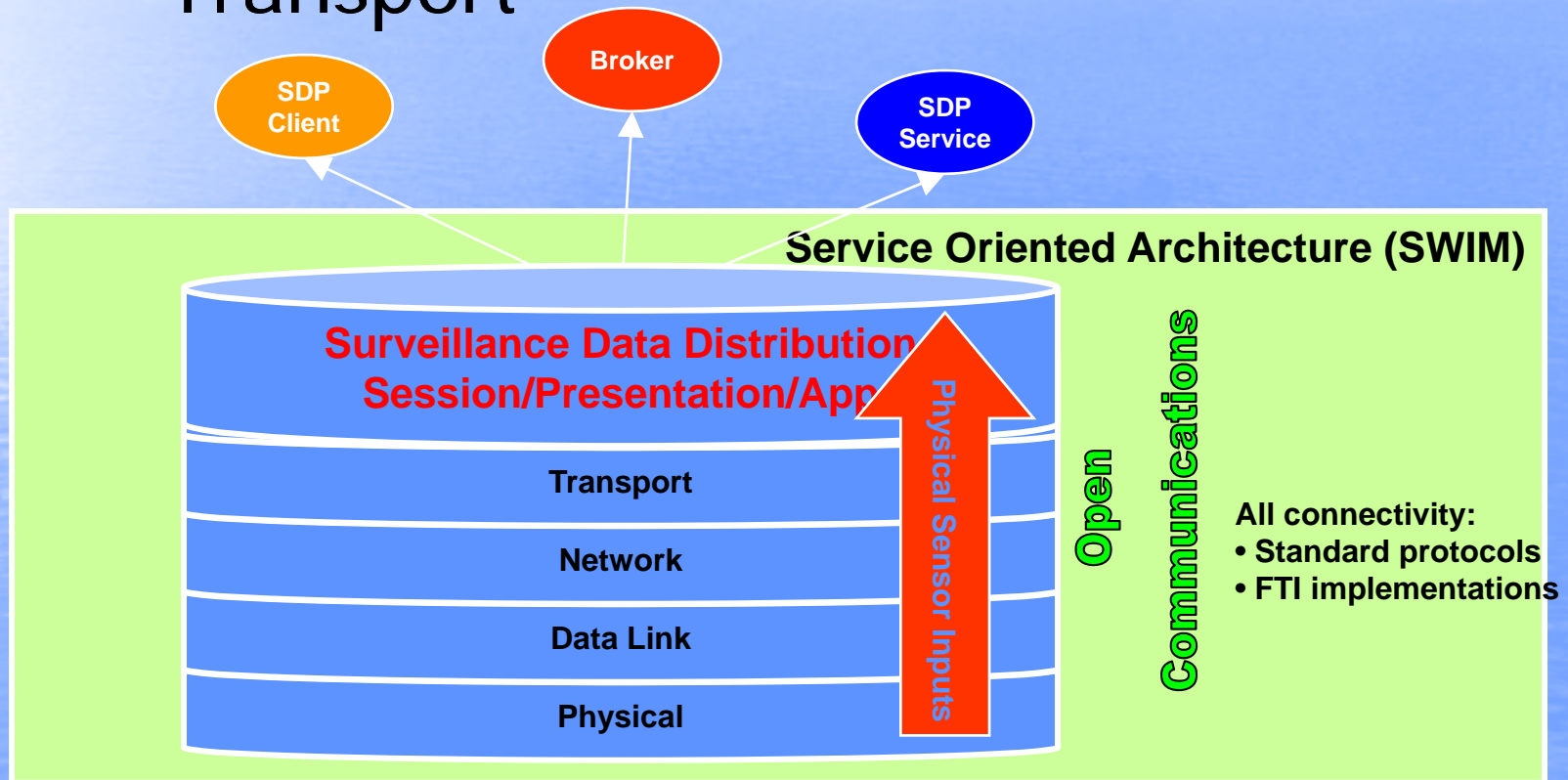
What is a Surveillance Data Distribution System

Surveillance Data Distribution System

Surveillance aware layer on top of a network cloud that understands the unique characteristics of surveillance data and provides services unique to surveillance data.

Surveillance Data Distribution

Surveillance Aware Layer on top of Transport



Capabilities of an SDDS

- Distribute Surveillance Data
 - Multiple diverse sources to diverse users
 - Provide for dynamic and static load balancing
- Provide services to validate, filter, and convert the data
- Provide a monitoring and control system
 - Surveillance aware
 - Monitors the SERVICE of surveillance data
- Provide common timely access to common surveillance information

Only a surveillance aware system can ...

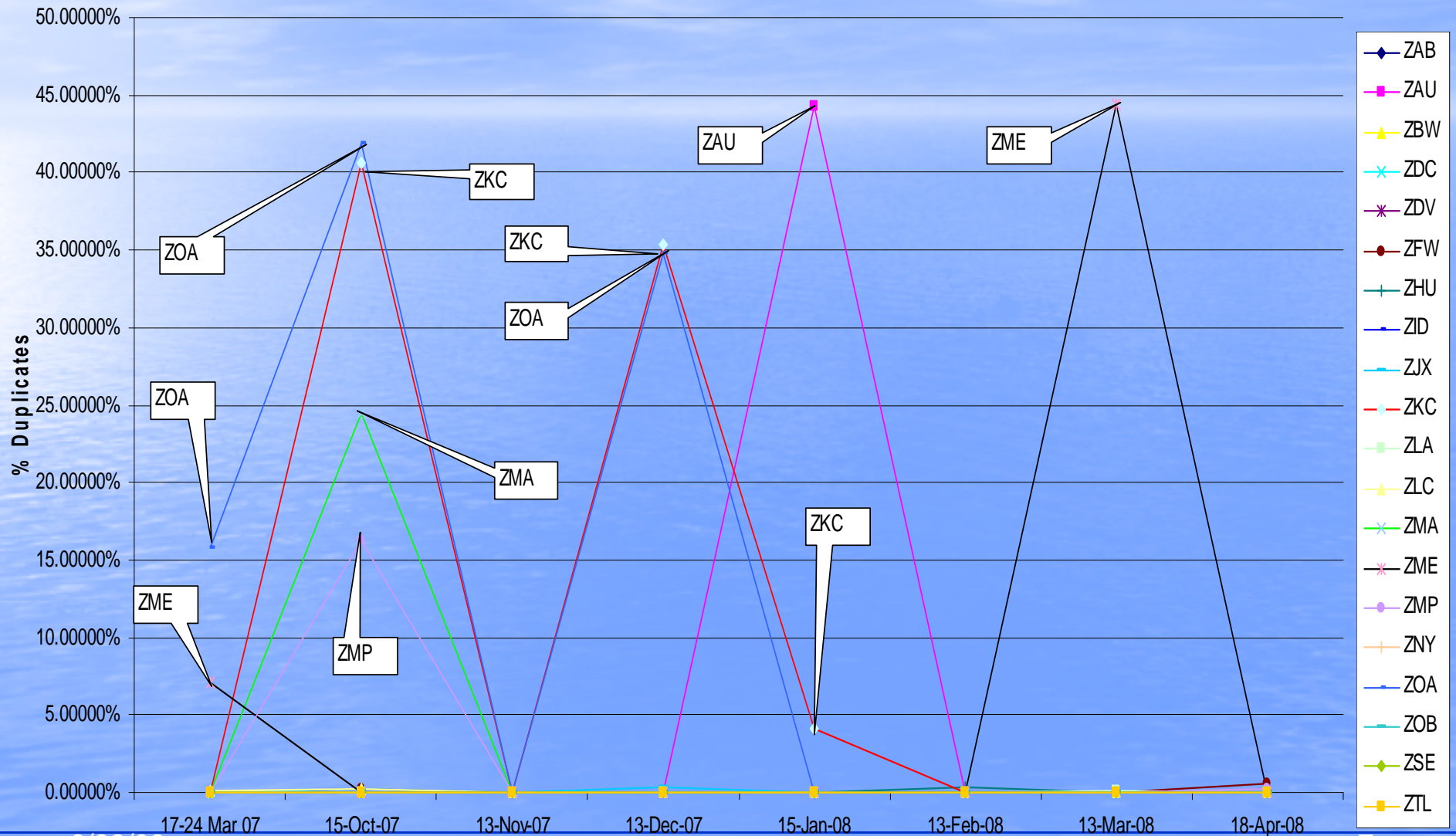
- Know to discard weather data when congested
- Remove duplicate messages
- Remove old messages
- Expedite North Mark Messages
- Remove bad messages
- Merge unique data from redundant feeds

Causes of IP Surveillance Distribution Problems

- **Router configurations**
 - System updates to add new services or users
- **Maintenance Actions**
- **Component Failures**
- **Bandwidth Limitations**
 - Yes FTI will limit bandwidth and discard data
- **Network Configuration Mistakes**
 - Duplication

Example of FTI Duplicate Packets

% Duplicates 24 Hour Sample Each Month



6/22/08

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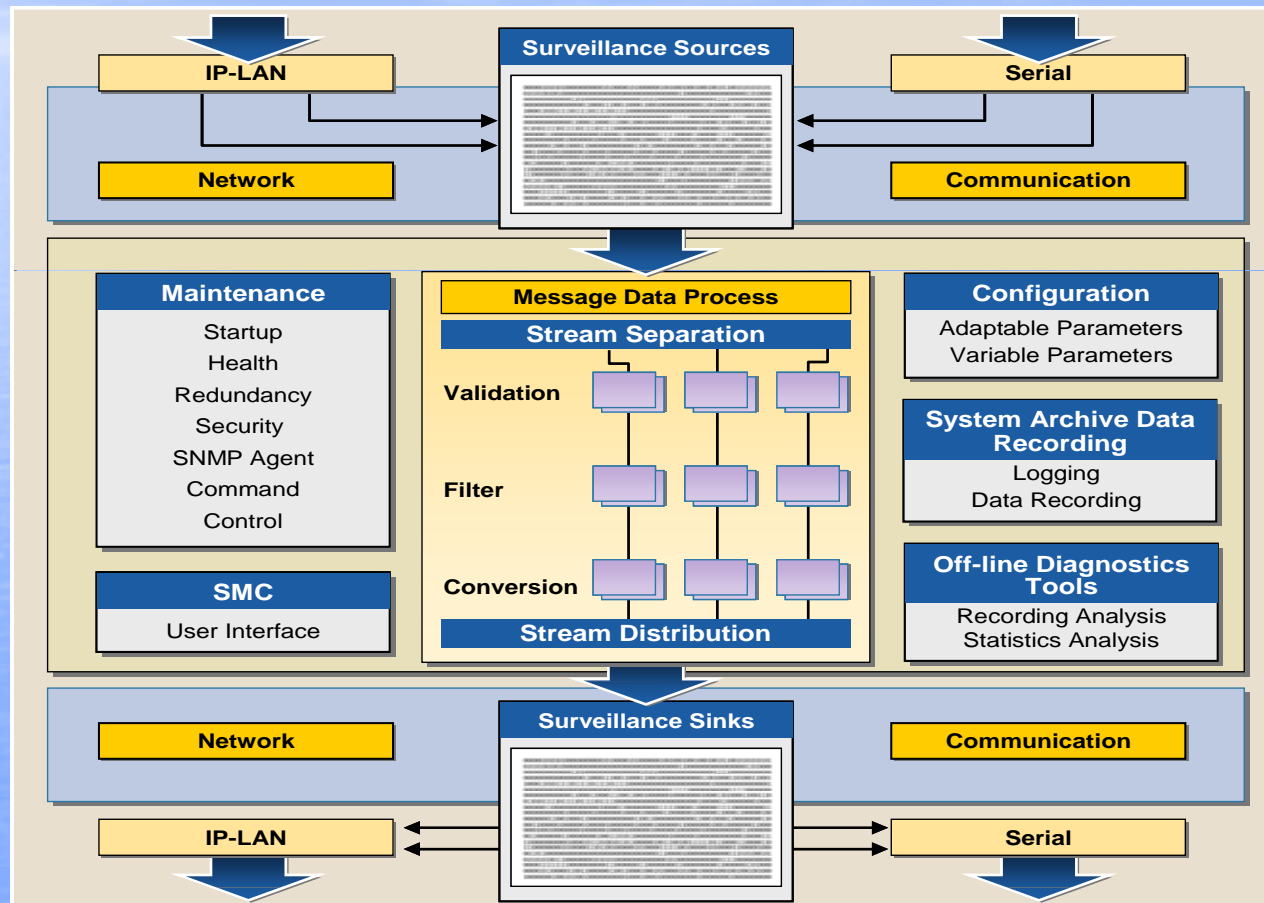
7 Months

SUNHILLO

Incorrect Perceptions of Network Performance

- **Latency**
 - Great, avg latency 25ms 99% < 50 ms
- **Accuracy**
 - Same or better than leased line due to increased checksum

Functional Representation of an SDDS



SDDS 131

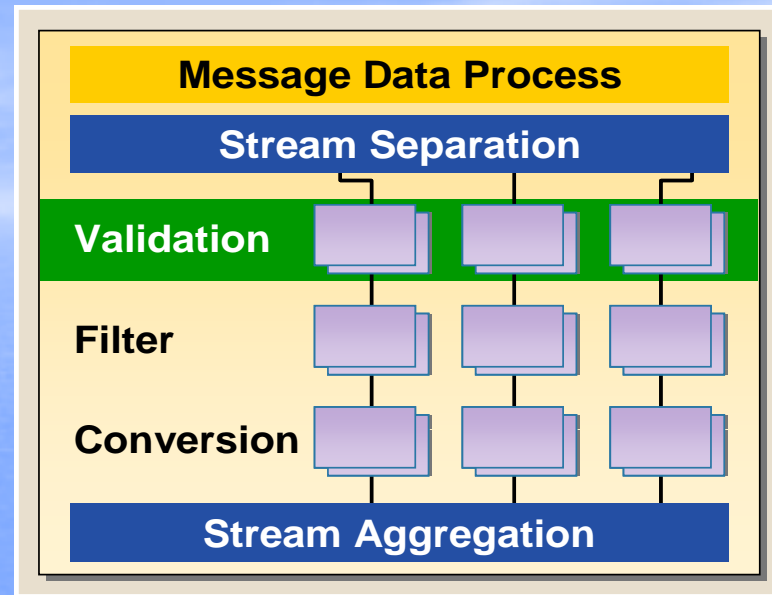
Validation

Examples of Validation Functions

- Field Range Validation
- Mandatory Field Validation

Benefits

- Improves quality of service
- Enhances security
- A large number of ASTERIX implementations have errors



SDDS 171

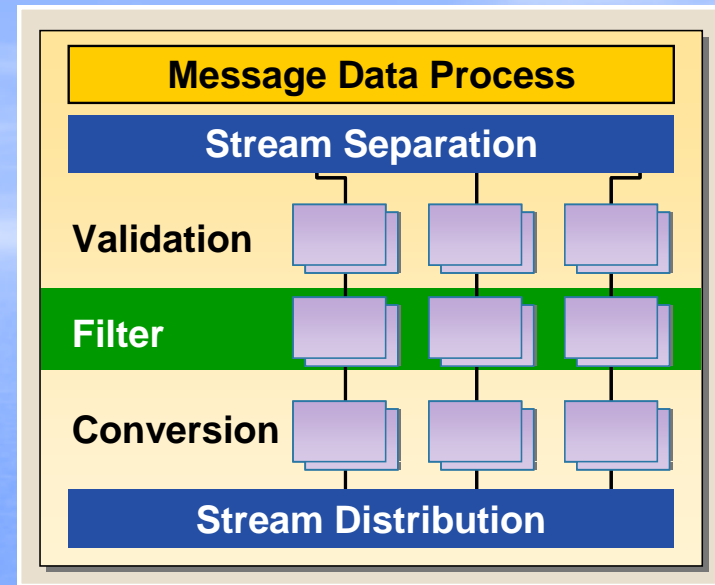
Validation prevents ill-formed messages from getting into automation

Filtering

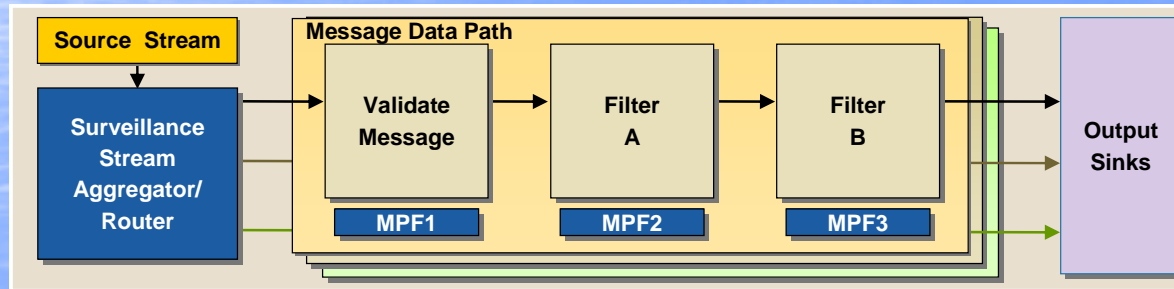
Examples of Filtering Functions

3D Position Filtering.

- ASTERIX Category Filtering
- Mode 3/A Filtering.
- Target Type Filtering
- Sector Mark Filtering
- Weather message Filtering
- Duplicate message Filtering.



SDDS 181

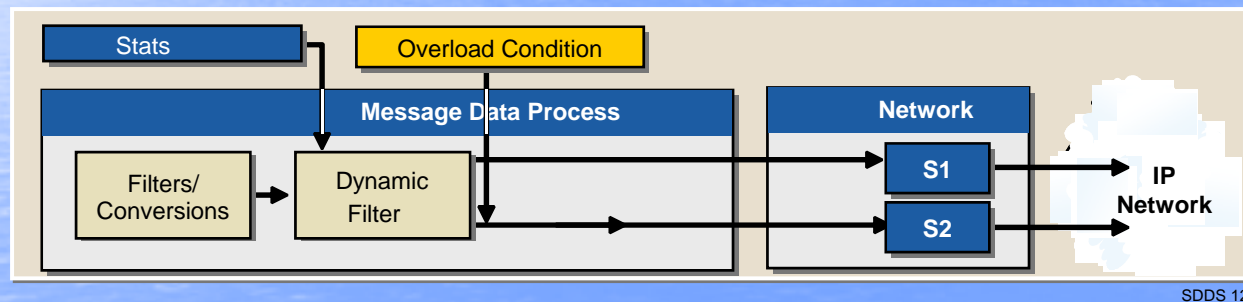


SDDS 129

Filtering allows reduced bandwidth and utilizes fewer resources at the consumer

Dynamic Filtering

- Allows priority filter when overloaded
- Selected filters get enabled depending on output thresholds
- Multiple levels of thresholds and filters can be adapted
- Filters are turned on or off depending on the load



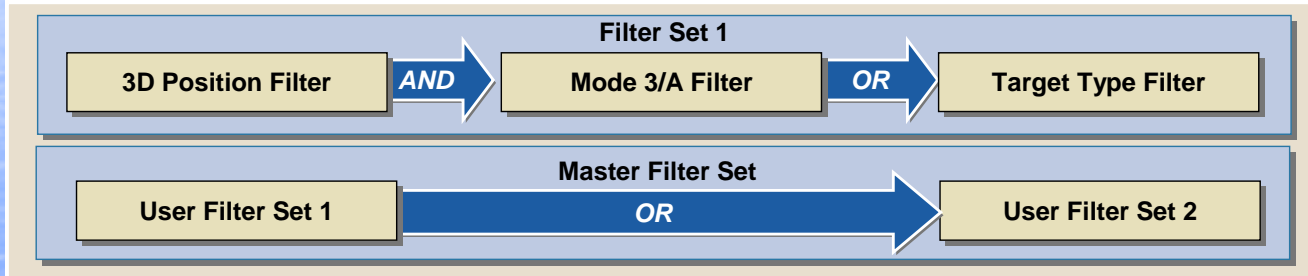
Dynamic Filtering controls what gets discarded when bandwidth limitations occur

Filtering Configuration

**FilterSet1 = (BeaconCode222Filter AND TrackTypeFilter)
OR (BeaconCode2221Filter AND PlotTypeFilter)**

Filter Sets can also be used in a logical equation like so:

MasterFilterSet = FilterSet1 OR FilterSet2

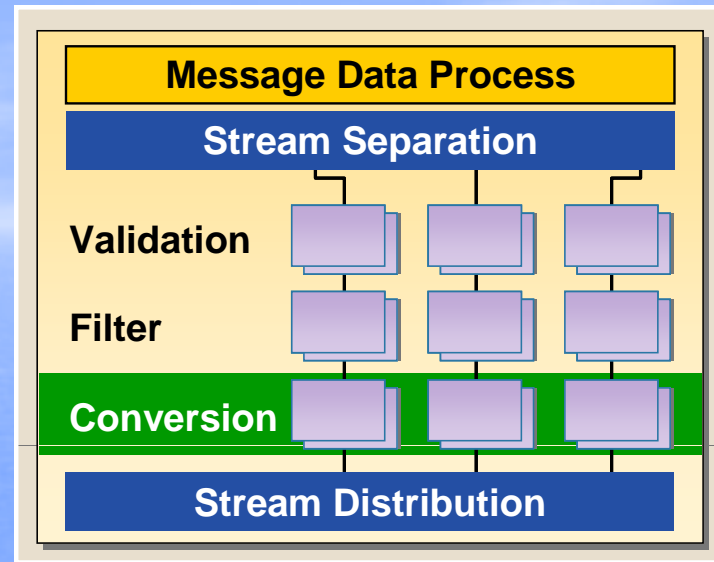


SDDS 119

Conversion

Convert from one format to another

- CD2
- ASR11
- ASR9
- ASTERIX CAT 1, 2
- ASTERIX CAT 34, 48
- ADS-B



SDDS 182

Conversion in the network allows Automation to accept the formats that it can handle

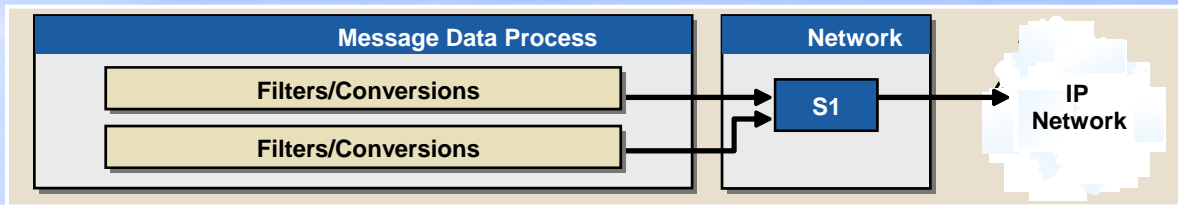
New resources eg, ADS-B, MLAT may appear on the network and the existing users can immediately utilize its services

Full fidelity is available by requesting native format

Distribution

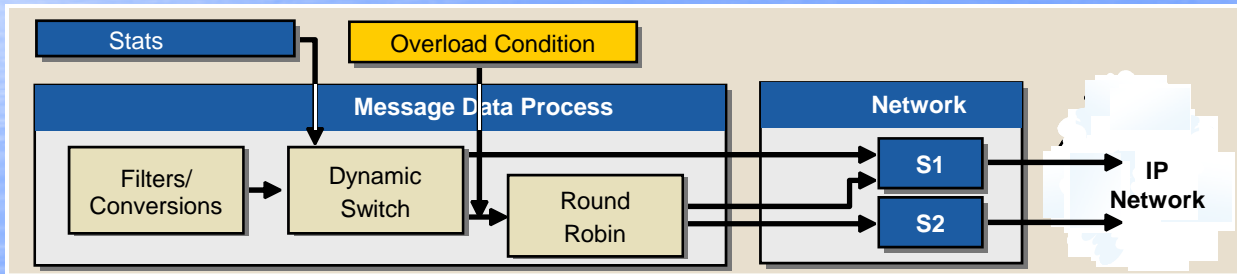
- The Data Distribution mechanism is responsible for data stream aggregation, data multiplication and merging
- Flexibility in configuring:
 - INPUTS
 - OUTPUTS
- Support for SOA services and Registries

Flexible Output Data Stream Control



SDDS 125

Data stream merging



SDDS 123

Dynamic load balancing and multiple output links

Redundancy

- No single point of failure
- Support multiple redundancy schemes
- Multiple input sources for the same data can be adapted and the system will automatically switch to a redundant source in case of a loss of data from the primary source of surveillance data.

Security

- Closed Network with VPN providing some level of security
- Encryption utilized for all supervisor access
 - Adaptation, Updates
- Encryption option available to allow validation of authenticity – Public Key

Is the information authentic?

Monitoring and Control



- Centralized Monitoring on **Service**
- Technical Performance **Monitoring**
 - Latency, errors, outages
- Have access to service delivery points
- Must provide immediate alerts on interruptions and allow automatic recovery
- Redundant data is usually available
- Capability to analyze and **control** problems

Summary

Existing air traffic transport networks, such as FTI require additional services to be capable of providing reliable and predictable services for surveillance data

Maximize and enable the sharing of Surveillance Information