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SAS Architecture Considerations and Requirements

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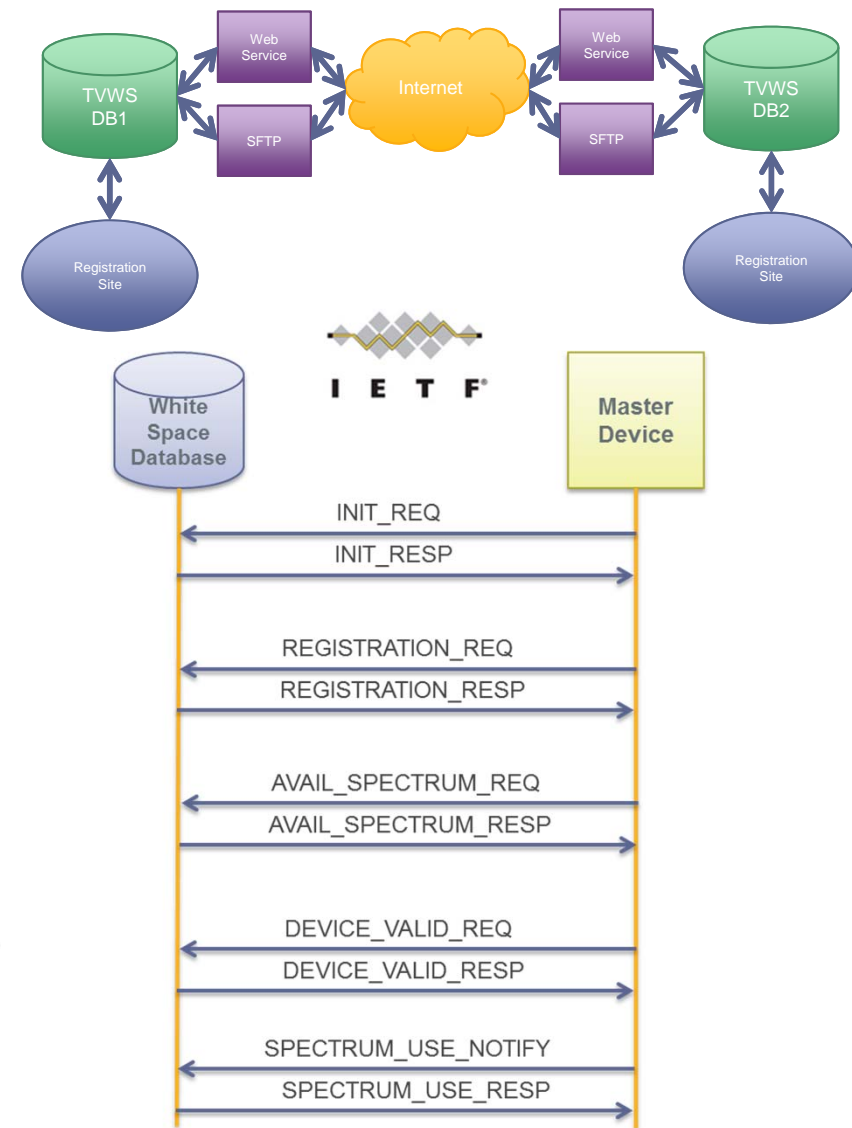
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Overall SAS Considerations

- Purpose of SAS
 - Protect incumbents (Tier I) from interference
 - Implement Licensed Shared Access (“LSA”) to manage access to spectrum by multiple Tier II licensees. Ensure policies are promulgated.
 - Provide Priority Access (Tier II) users protection from General Authorized Access (Tier III) interference for high reliability
 - Allow qualified Tier III usage in spectrum not allocated to Tier I and II users
- Data considerations
 - More specific incumbent information is better
 - If incumbent information is vague, more conservative protection criteria is required, leading to inefficient spectrum use
 - Some federal system information cannot be specific due to data sensitivity
 - Regulatory SAS (RSAS) could obfuscate sensitive info before passing it on to commercial third-party SASs
 - Tier II users can obtain licenses for extended periods and are protected from Tier III users
 - Similar to protection mechanisms for registered entities in TVWS

SAS Communications Architecture

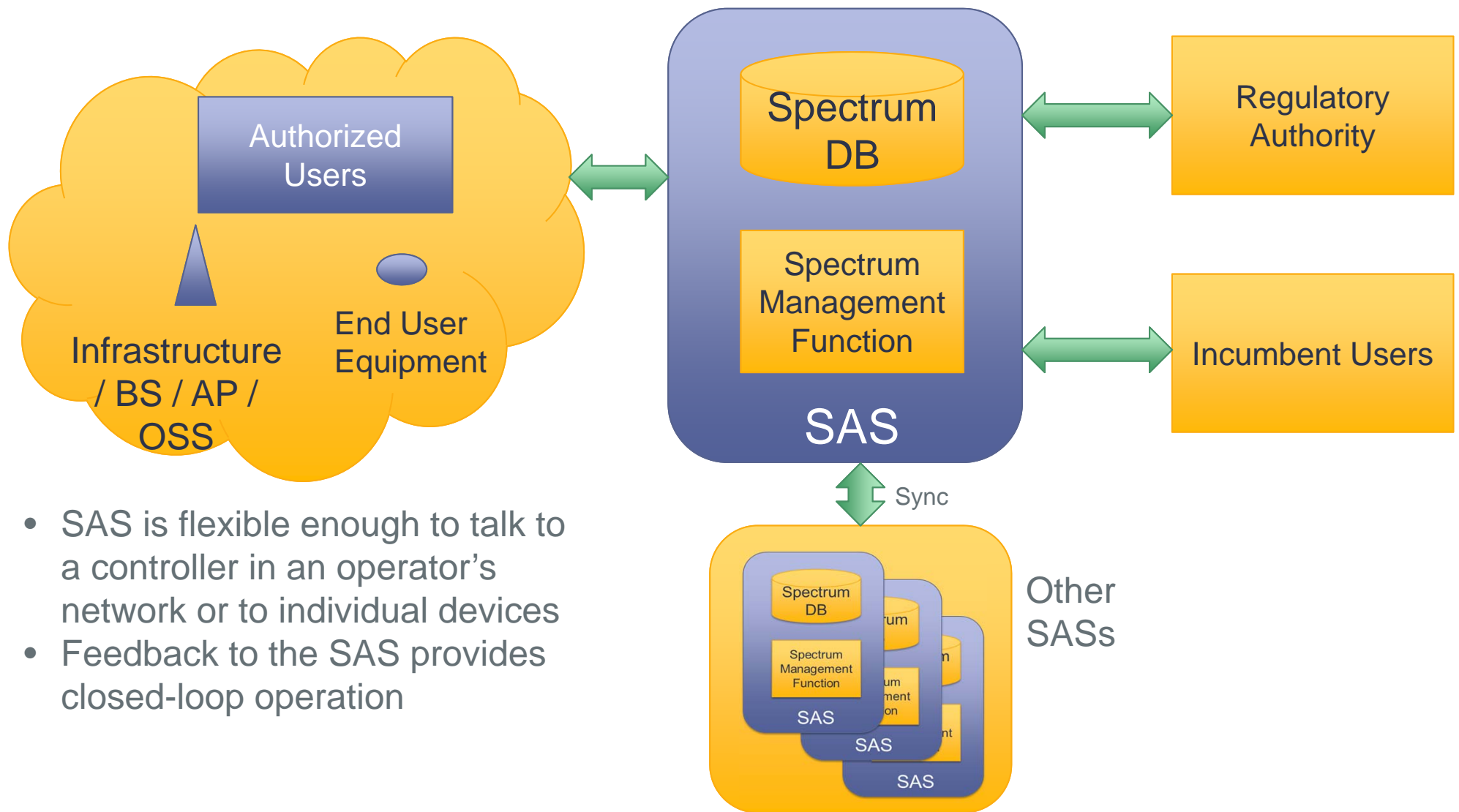
- SAS to SAS
 - Authentication and data privacy could be provided through TLS over HTTP (HTTPS) with certificates
 - A web-services interface (with SFTP backup) was defined by the TVWS DBA interoperability group, which could act as a model for inter-SAS synchronization
- SAS to Registered Stations
 - Authentication and data privacy could also be provided through TLS over HTTP (HTTPS) with certificates
 - Information regarding channels available for use along with schedules for use can be provided over this interface, as is done with TVWS
 - More complicated interactions may also be needed, e.g., contract negotiation
 - Closed-loop operation is possible with use reports from devices
 - The IETF PAWS interface used by WS devices can also be used as a model



Communications Considerations

- Two possible modes of SAS to AU updating
 - Sessionless updating through use of AU polling
 - Similar to current TVWS implementation
 - Polling interval set by SAS
 - AU provides periodic report of need for spectrum
 - May be problematic when AU does not report and can't be reached
 - Session-based updating
 - “Push” of data from SAS to AU possible to allow rapid vacating of spectrum
 - Need to maintain session parameters would require AU to update/report IP address changes to SAS keep session active
 - SAS can initiate a “reconfiguration” to change terms of spectrum use
- Usage reporting back to the SAS is possible in either method
- If connection is lost, spectrum assignment is withdrawn

Spectrum Access System



- SAS is flexible enough to talk to a controller in an operator's network or to individual devices
- Feedback to the SAS provides closed-loop operation

TVWS Database Parallel

