Overall context

- **SC214/WG78 mission**
  - Deliver **Safety Performance Requirements** (SPR) and **Interoperability requirements** (Interop) for Advanced Data Link Air Traffic Services (ATS) to support
    - NextGen
    - SESAR
    - Future oceanic/remote operations
    - ICAO GANP (Baseline 2 pertains to ICAO Block 1 for B1-15 Improved airport operations & B1-40 improved traffic synchronization and TBO)
  - Define data link services and applications independent, to the maximum extent practical, from the underlying network technology
  - Support implementation of aircraft data comm systems that will operate in both continental and oceanic environments (i.e. convergent SPR/Interop Standards), for all types of airspaces (Airport, TMA, domestic en-route & oceanic en-route)
Scope (services)

Current Oceanic SPR
ED122/D0306

AFN
DLIC

CPDLC
CE, CT, TC
CRD
CPDLC for ITP

ADS-C
IER
PR

FIS

Excluded from ATN B1
(SES DLS IR)

CPDLC for ITP
CPDLC for FIM & ITP
CRD
OCL
PR
IER
Deliverables (1/2)

- Supporting current operations
  - **Change 1 to ED122/DO306** (Oceanic SPR)
    - ITP messages and procedures
  - **Rev A of ED154/DO305** (Mixed Interop ATN & FANS-1/A) and **Change 1 to ED110B/DO280B** (ATN B1 Interop)
    - Seamless transfers between FANS 1/A and ATN B1 airspaces
Deliverables (2/2)

- **Baseline 2 standards**
  - **Advanced ATS Data Communication SPR**
    - Safety and Performance Requirements independent from technology
  - **Advanced ATS Data Communication Interop Via ATN**
    - Interoperability Requirements (including backwards compatibility with B1)
  - **Advanced ATS Data Communication Interop Via a Mix of ATN and FANS-1/A**
    - Interoperability Requirements supporting FANS 1/A aircraft in B2 airspace and seamless transfers between FANS 1/A & ATN ATC Centers

Draft V0.H (Baseline for Validation)  
Feb 2010  

Draft v0.1 (updated version)  
Feb 2012  

v1  
Mar 2014
Starting from PANS ATM (ICAO Doc 4444) Ed 15th

New CPDLC message elements created and some existing CPDLC message elements modified to support new ATS Data Link services, e.g.
- 4DTRAD (4D Trajectory exchanges)
- D-TAXI (Taxi route clearances and information)
- Departure Clearance (DCL)
- Oceanic Clearance (OCL)
- CPDLC for In Trail Procedure (ITP)
- CPDLC for Flight Interval Management (FIM)

Message set enriched to encompass lessons learnt from current operations (e.g. new message elements defined as standardize Free Text or deletion of unused messages as in GOLD v1)

To ensure that Baseline 2 CPDLC Message Set will fulfill the operational needs and support worldwide ATS Datalink operations
WG78/SC214 effort for rationalization

- Prompted by OPLINKP in 2010, assessment of the operational need for each message, leading to message deletions, revisions and additions

- Relying on an operational assessment
  Analysis coordinated by WG78/SC214 with wide inputs from
  - Pilots
  - Human factors specialists
  - Controllers (Eurocontrol, FAA, ISAVIA acting as NAT representative, NATS, Nav Canada, Airways New Zealand, Air Service Australia…)
  - ANSPs representatives (taking credit from both FANS 1/A and ATN B1 operations)
  - Ground systems specialists, and
  - Aircraft manufacturers
WG78 / SC214 closely coordinated with ICAO OPLINKP

- Initiated at OPLINKP-WG/WHL 1 in October 2010
- Iterative exchanges have occurred to support validation and rationalization of the CPDLC message set
  - OPLINKP-WG/WHL 2 (May 2011) and WHL 3 (Oct 2011)
  - Initial coordination about the CPDLC message set assessment
  - OPLINKP-WG/WHL 4 (Mar 2012)
  - Full review of a “redline” version of the message set
- Apr 2012 - May 2012
  - 1st review of proposed CPDLC message set by ICAO OPLINKP member states and their representatives
    - Comments received from AENA (Spain), ENAV (Italy), Federal Aviation Administration (USA), NavCanada (Canada), Naviair (Denmark) and industry (e.g., SESAR, Airbus, Boeing)
    - ATNS (South Africa) and DECEA (Brazil) responded without recommending any changes
  - OPLINKP-WG/WHL 5 (Sep 2012)
    - Further updates of CPDLC message set according to comments.
- Nov 2012 – Jan 2013
  - 2nd review of updated CPDLC message set by ICAO OPLINKP member states and their representatives
    - Comments received from NATS (UK), ATNS (South Africa), NavCanada (Canada) and industry
- OPLINKP-WG/WHL 6 (Mar 2013)
  - Consolidation of CPDLC message set according to comments
With about the same total number of messages, the proposed CPDLC message set maintains the current capabilities and supports new ones.
WG78/SC214 effort for convergence

- Maintaining services offered by FANS 1/A, considering lessons learnt
- Introducing new capabilities to support advanced Trajectory Based Operations
  - ADS-C Extended Projected Profile
  - ETAmín-max
  - New ADS-C events

- Changes relative to last downlinked value
  - Waypoint change
  - Speed change
  - EPP change
  - FOM change
  - Level change
- Changes relative to fixed threshold(s)
  - Lateral deviation
  - Vertical rate deviation
  - Level range deviation
  - Vertical clearance deviation
  - Aircraft out of vertical boundaries
  - Speed range deviation
SC214/WG78 Operational Performance Assessment (OPA)

- RCP for CPDLC, RSP for ADS-C and RIP for FIS

**Communication Transaction Time**
- Maximum transaction time
- Nominal transaction time (95%)

**Continuity, Availability and Integrity**

**Allocations** to human and technical ATM/CNS elements (i.e. the aircraft system, aircraft operator, ATS Provider and Air-Ground Communications Service Provider), statistically for Transaction Time.
## RCP/RSP in Baseline 2

### RCP communication Transaction Time, 99.9% Continuity and 95% Probability

<table>
<thead>
<tr>
<th>RCP Specification</th>
<th>RCP120</th>
<th>RCP-DCL</th>
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</thead>
<tbody>
<tr>
<td><strong>Transaction Time Parameter</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ET (sec) C=99.9%</td>
<td>120</td>
<td>18</td>
</tr>
<tr>
<td>TT (sec) P=95%</td>
<td>57</td>
<td>8</td>
</tr>
<tr>
<td><strong>Notes</strong></td>
<td>See Note</td>
<td>See Note</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Transaction Time</strong></th>
<th>99.9%</th>
<th>95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET (sec) C=99.9%</td>
<td>120</td>
<td>18</td>
</tr>
<tr>
<td>TT (sec) P=95%</td>
<td>57</td>
<td>8</td>
</tr>
</tbody>
</table>

### RCP Time Allocations

| **Initiator** | 30 | See Note |
| **TRN** | 100 | 4 |
| **Responder** | 88 | 38 |
| **RCTP** | 32 | 8 |

### TRN Time Allocations

| **ATSP** | 23 | 12 |
| **ATSU** | 14 | 6 |
| **ACSP** | 18 | 8 |
| **Aircraft** | 23 | 10 |

### Notes

*Note: Values are to be specified by each State*
<table>
<thead>
<tr>
<th>RSP Specification</th>
<th>RSP120 Single/1st Periodic/Baseline report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction Time</td>
<td>OT (sec) C=99.9%</td>
</tr>
<tr>
<td>Parameter</td>
<td>DT (sec) P=95%</td>
</tr>
<tr>
<td>Transaction Time</td>
<td>120</td>
</tr>
<tr>
<td>RSP Time Allocations</td>
<td></td>
</tr>
<tr>
<td>Initiator (Controller)</td>
<td>30</td>
</tr>
<tr>
<td>TRN = RSTP</td>
<td>10</td>
</tr>
<tr>
<td>ATSP</td>
<td>23</td>
</tr>
<tr>
<td>ATSU</td>
<td>14</td>
</tr>
<tr>
<td>ACSP</td>
<td>18</td>
</tr>
<tr>
<td>Aircraft</td>
<td>95</td>
</tr>
</tbody>
</table>

"RCP/RSP in Baseline 2"
### RCP/RSP communication Transaction Time and Continuity

<table>
<thead>
<tr>
<th>RSP Specification</th>
<th>RSP180D Next Periodic/Event report</th>
<th>RSP400D Next Periodic/ Event report</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transaction Time Parameter</strong></td>
<td><strong>OT (sec)</strong></td>
<td><strong>DT (sec)</strong></td>
</tr>
<tr>
<td><strong>C=99.9%</strong></td>
<td><strong>P=95%</strong></td>
<td><strong>C=99.9%</strong></td>
</tr>
<tr>
<td>Transaction Time</td>
<td>180</td>
<td>89</td>
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<tr>
<td>RSTP</td>
<td>180</td>
<td>89</td>
</tr>
</tbody>
</table>

**RSP (RSTP) Time Allocations**

<table>
<thead>
<tr>
<th></th>
<th>ATSU</th>
<th>ACSP</th>
<th>Aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>180D</td>
<td>7</td>
<td>17</td>
<td>9</td>
</tr>
<tr>
<td>400D</td>
<td>3</td>
<td>378</td>
<td>41</td>
</tr>
</tbody>
</table>

**Notes**

*Note 1.* — For the RSP180D/400D specifications (next Periodic/Event report), the Initiator time has been apportioned to the FMS.

*Note 2.* — For the RSP180D/400D specifications (Next Periodic/Event report), the recipient is the controller.

*Note 3.* The bolded values represent the constraining points in the assumed statistical distribution. The remaining points are allocated to fit the assumed distribution.
# RCP/RSP in Baseline 2

## RIP communication Transaction Time, 99.9% Continuity and 95% Probability

<table>
<thead>
<tr>
<th>RIP Specification</th>
<th>RIP180 (Single/1\textsuperscript{st} update report)</th>
<th>RIP400 (Single/1\textsuperscript{st} update report)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction Time</td>
<td>TT\textsubscript{max} (sec) C=99.9%</td>
<td>TT\textsubscript{95} (sec) P=95%</td>
</tr>
<tr>
<td>Transaction Time</td>
<td>180</td>
<td>199</td>
</tr>
</tbody>
</table>

### RCP Time Allocations

<table>
<thead>
<tr>
<th>Initiator (Flight crew)</th>
<th>30</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRN = RITP</td>
<td>85</td>
<td>195</td>
</tr>
<tr>
<td>TRN = RITP Time Allocations</td>
<td>395</td>
<td>155</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D-HZWX Provider</th>
<th>155</th>
<th>67</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACSP</td>
<td>32</td>
<td>153</td>
</tr>
<tr>
<td>Aircraft</td>
<td>74</td>
<td>32</td>
</tr>
</tbody>
</table>
Baseline 2 standards timeline

Next Steps

After 5 years of work, WG78/SC214 on the finish line … targeting **release of Baseline 2 standards by Mar 2014**

Two remaining opportunities to provide feedback on the proposed standards

- **Apr-May 2013**: WG78/SC214 review, based on a consolidated draft of SPR & Interop documents
- **Sep-Oct 2013**: WG78/SC214 Final Review (FRAC/Open Consultation)

Comments from ALL are more than welcomed !!!

WG78/SC214 website:

http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_comms_services/sc214/

Documents to review can be found under the “Current documents” section
QUESTIONS?