

SESAR PJ14 COM Open Day

23.10.19 CPDLC – Data Link

Supporting
European
Aviation

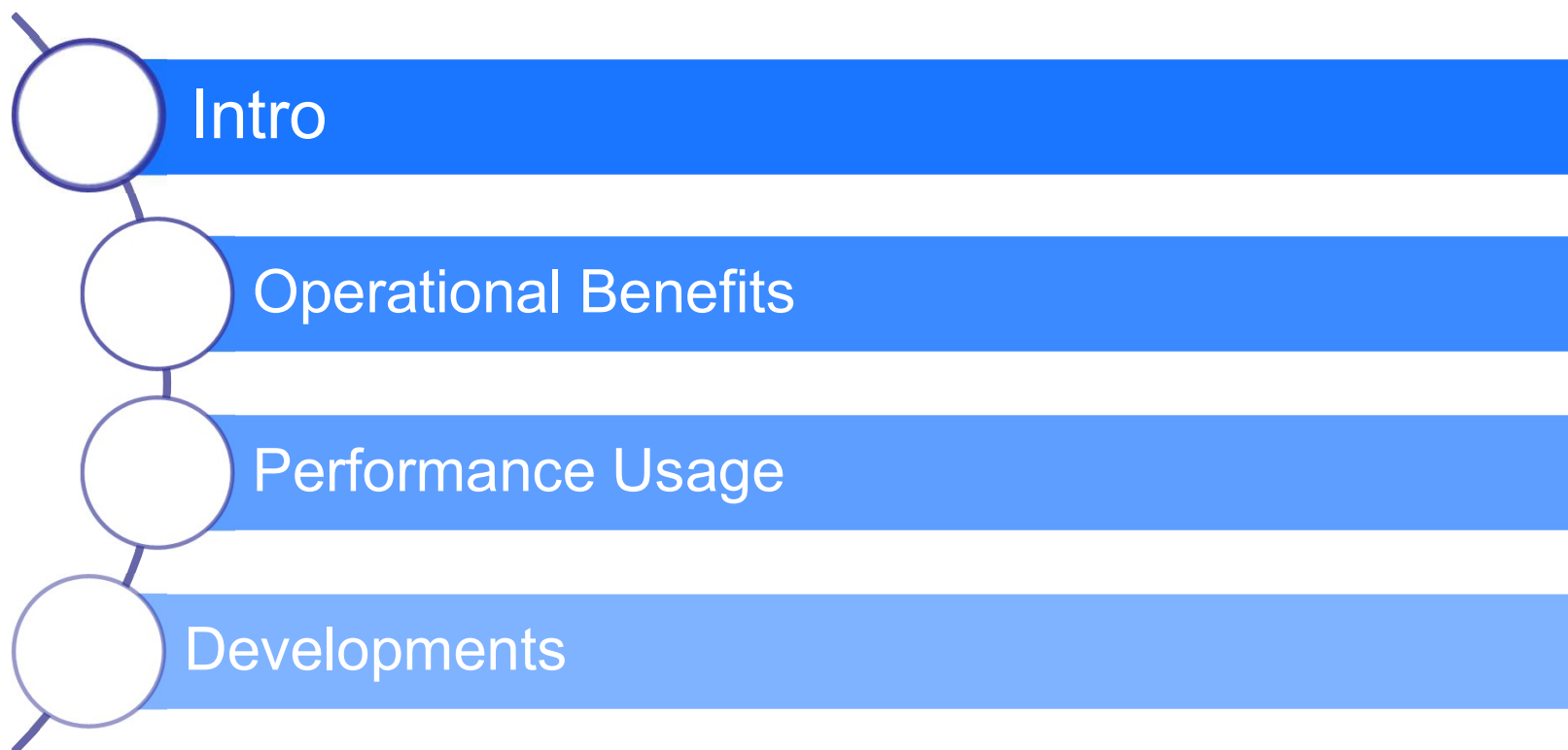


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Maastricht Upper Area Control Centre



Agenda



Multi National GAT/OAT integrated ATM

MUAC

Maastricht Upper Area Control Centre



MUAC Airspace



Cross-border sectors based on functional rather than national boundaries
Sector throughput: up to **80 aircraft/hour**
Variable Division Flight level for more effective airspace management
Seamless technology across the 4 States

Dense Direct Route Network

Over 500 direct routes connected to neighbouring airspace
More than 70% of aircraft operators use these routes on a regular basis

Air Traffic Controller Productivity



+64% above the average of cluster 2 ANSPs

(Source: ACE 2014, May 2016, pp. 27 & 28)

Traffic

- Yearly traffic (2015): **1.7 M flights**
- Peak daily traffic: **5,481 flights**
- Average daily traffic: **4,664 flights**
- 80% of the traffic** is climbing from and descending to Europe's busiest hubs
- MUAC handles **17%** of European traffic and represents **1.7%** of European system gate-to-gate ATM/CNS provision costs

Operational conditions

Aggregated complexity score

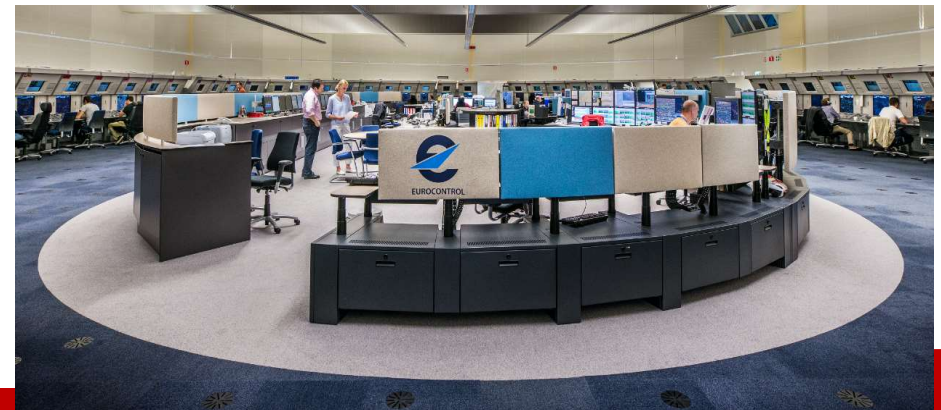


(Source: ACE 2014, May 2016, p. 108)

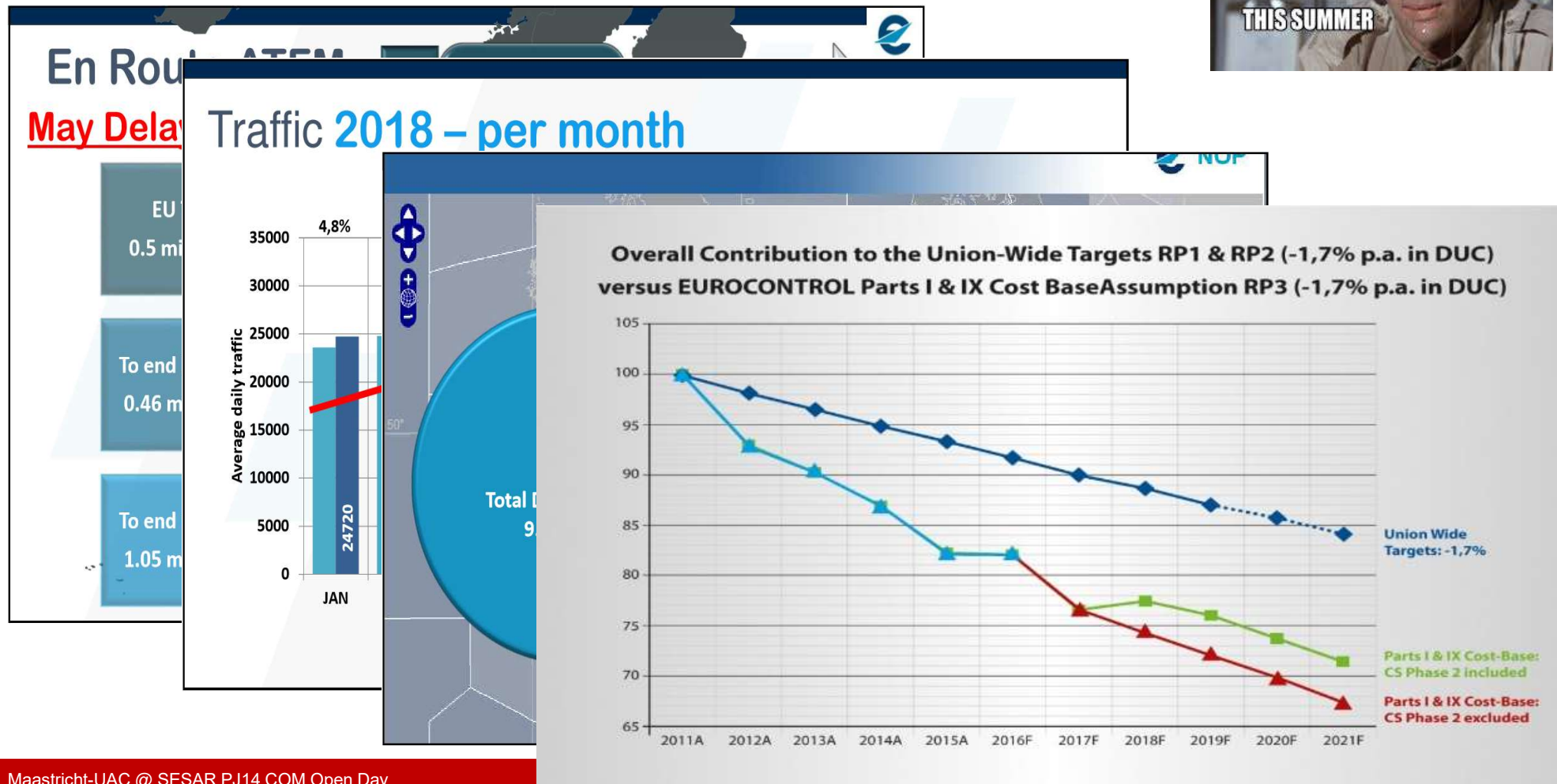
Seasonal traffic variability



614 employees / 30 nationalities



14.3 Mio EUR Cost through delays!



DON'T TEXT WHILE DRIVING. TEXT WHILE FLYING!

The problem:
growing air traffic

A solution:



Written messages between pilots
and air traffic controllers =

CPDLC



60%
of incidents relate to comm issues

Saturation of voice comm channels

Miss under
standings

Simultan
eous
Trans-
missions

Call sign
Con-
fusion

R/T
Discipline

Non Standard
R/T

Regional
Accents

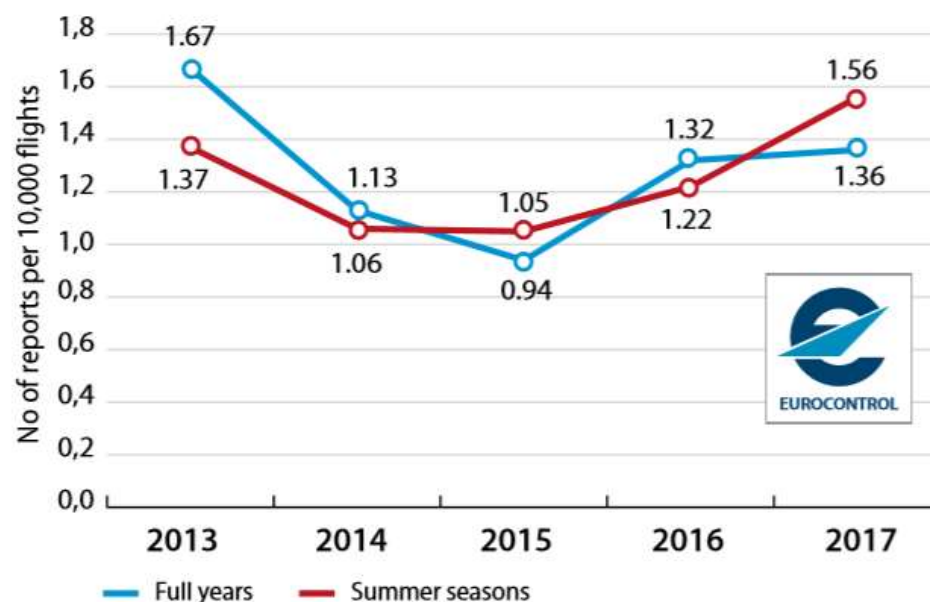
AIR-GROUND COMMUNICATION IN THE PERIOD 2013-2017

EVAIR bulletins within 'Air-ground communication' cover two main areas: 'Spoken' and 'Operational' communication. Both areas are part of and defined by the EUROCONTROL HEIDI taxonomy. (See definitions on page 57).

In 2017 'air-ground communication' consisting of 'spoken' and 'operational' communication accounts for almost 40% of the top seven contributors to ATM occurrences identified in the EVAIR database, and is 5% higher than in 2016. Spoken communication is a much bigger contributor than operational communication.

'Air-ground communication' continues to be the most frequent contributor to: 'runway and taxiway incursions', 'level busts', 'call sign confusion', 'ACAS RAs' and 'go-around'.

Figure 34: Air Ground communication summer seasons 2013-2017



Timeline

- 1985 Data Link Forum
- 1995 PETAL I & II
- 2003 ATN/FANS ops at MUAC

DLS IR 29/2009

- 2013 Protected Mode / White List
(2015/310)
- 2017 Multi Frequency Ops
- 2019 Base Line 2 Pre Ops at MUAC
- 2020 Base Line 1 Mandate

Data Link In Maastricht

Data link is not new. ARINC introduced the first system, the Aircraft Communications Addressing and Reporting System (ACARS) in 1978. Airlines started using it widely from the mid 1980s to keep in contact with their crews during flight. The idea of using data link for air traffic control was first brought up around the same time. Eurocontrol showed an early interest and quite naturally, Maastricht UAC would once again pioneer this new technology.

In 1985, during the earlier mentioned "R/T: The Vital Link" EGATS forum, pilots were extremely enthusiastic about this. Quoting Captain G. Plukkel (KLM B-747 pilot) during the forum: "The sooner R/T becomes just a means of redundant communication – perhaps only in emergency situations – the safer aviation will become. In the future, perhaps R/T should be abolished altogether. There should be no more read backs, no more time consuming discussions on the radio, no more waiting for a gap to transmit a message. There would be no problems anymore with different languages. And the biggest advantage of all: much less R/T and much less direct and active involvement of human beings." And he concluded his speech by saying: "R/T? Let's get rid of it as much and as soon as possible!"

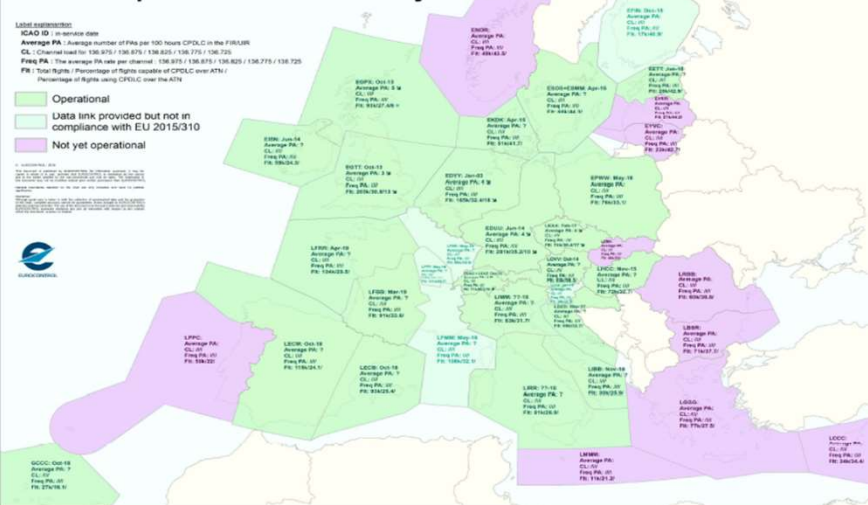
Quite the speech in 1985! But as we know, things didn't go quite the way everyone wanted... Ten years later, in 1995, we in Maastricht still believed that Data Link was the future and we were (again!) the first centre in the world to conduct the first live operational trials. This became known as the PETAL project.

The EGATS R/T Forum in 1985. The head table from left to right: Nigel Corrigan, inventor of the frequency anti blocking device CONTRAN, Don Ellis, Capt 747 Singapore Airlines and ex BA Concorde captain, Geoff Gillett, Vice President EGATS and chairing the Forum, Myself and Boeriger, head of the Communication team in Maastricht ENG.

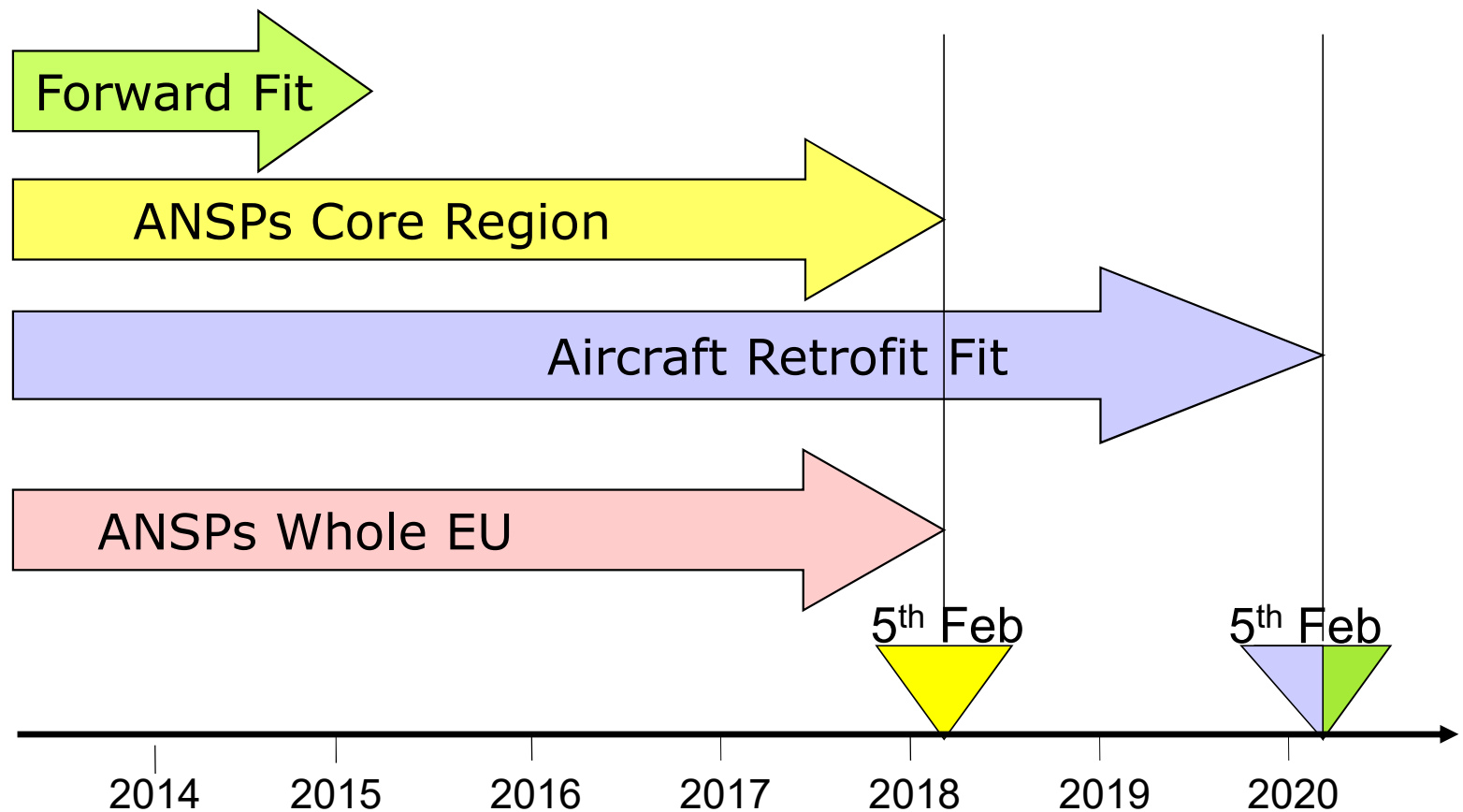


118 THE EUROCONTROL MAASTRICHT UAC FIRST 40 YEARS OF OPERATIONS - 1972 - 2012

CPDLC Operational Status - May 2019



SES DLS IR No 29/2009 (2015/310)

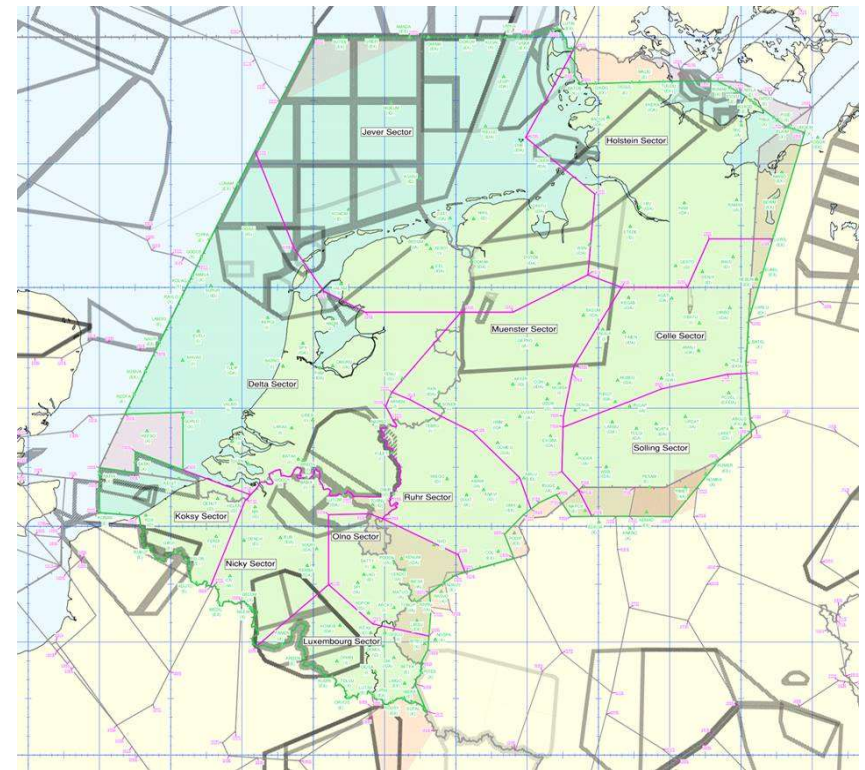
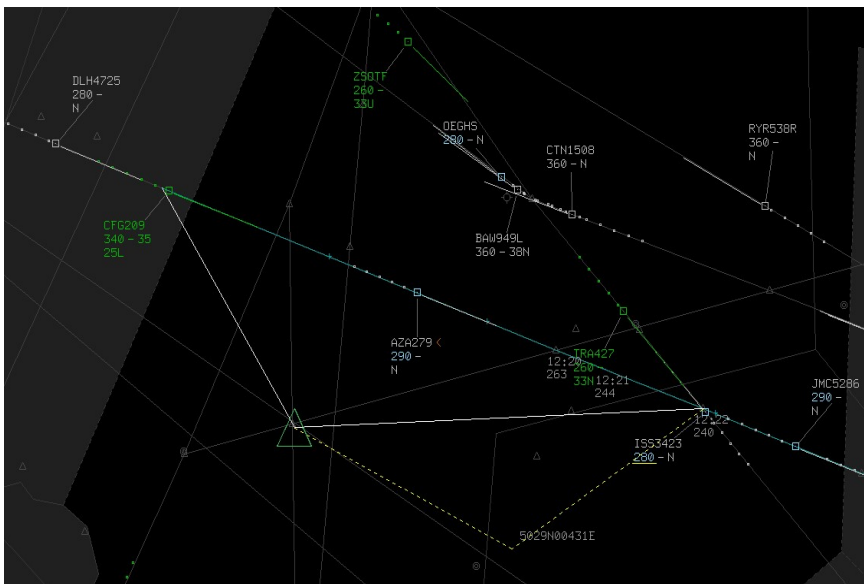


CPDLC UL messages at MUAC



- **PROCEED DIRECT TO (point)**
- TURN (direction) HEADING (point)
- TURN (direction) (degrees)
- FLY HEADING (degrees)
- **RESUME OWN NAVIGATION**
- **RESUME NORMAL SPEED**
- SQUAWK (code)
- **CLEARED** (route, clearance)
- **STATE TOP OF DESCENT**
- CONTINUE PRESENT HEADING
- CLIMB TO (level)
- DESCEND TO (level)
- CLIMB TO REACH (level) BY
- DECENT TO REACH (level) BY
- CONTACT (unit name) (frequency)
- SQUAWK ident
- **WHEN CAN YOU ACCEPT** (level)
- MAINTAIN (speed)
- MAINTAIN PRESENT SPEED
- MAINTAIN (speed) OR GREATER
- MAINTAIN (level)
- MAINTAIN (speed) OR LESS
- **CHECK STUCK MICROPHONE (frequency)**
- **CLEARED TO (position) VIA (route clearance)**
- **STATE PREFERRED LEVEL**

1. CLEARED TO (position) VIA (route clearance)



2. Call Sign Confusion



Figure 26: Call Sign Confusion summer seasons 2013 - 2017

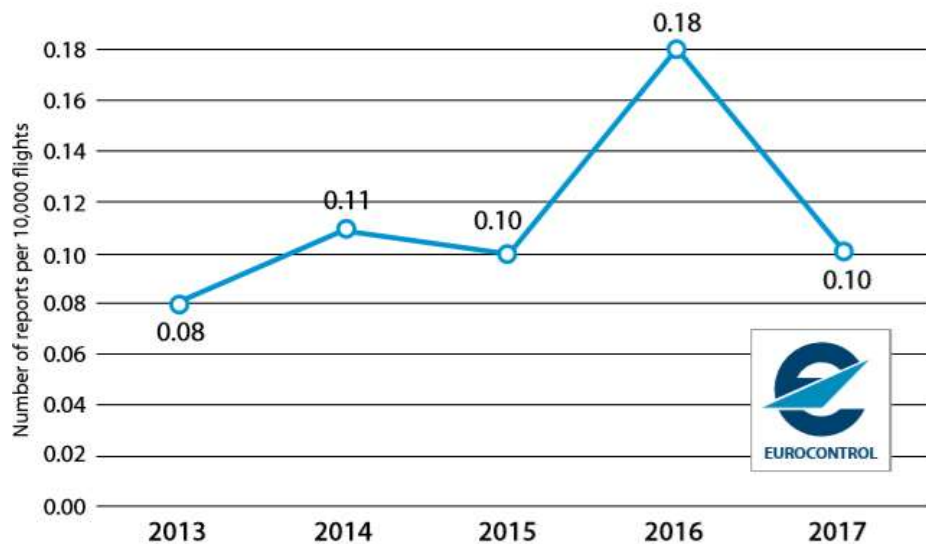
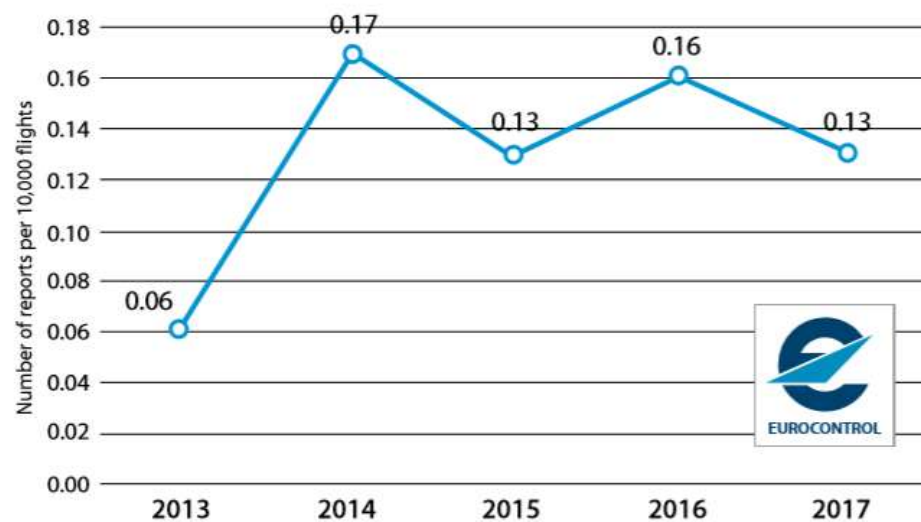


Figure 28: Call Sign Confusion 2013 - 2017



3. Increasing COM Safety!

HF unnoticed Head back / Read back errors

- Failure to correct faulty read-back.
- Expectation bias.
- Failure to request confirmation or clarification.
- Failure to question instructions.



4. Prolonged Loss Of Communication -> Alpha Scramble



Figure 41: Loss of communication summer seasons 2013 – 2017

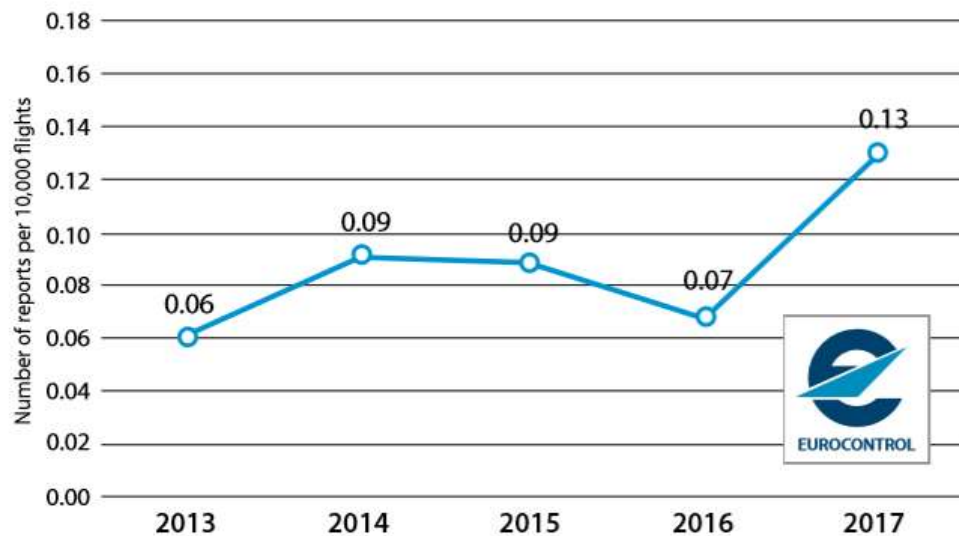
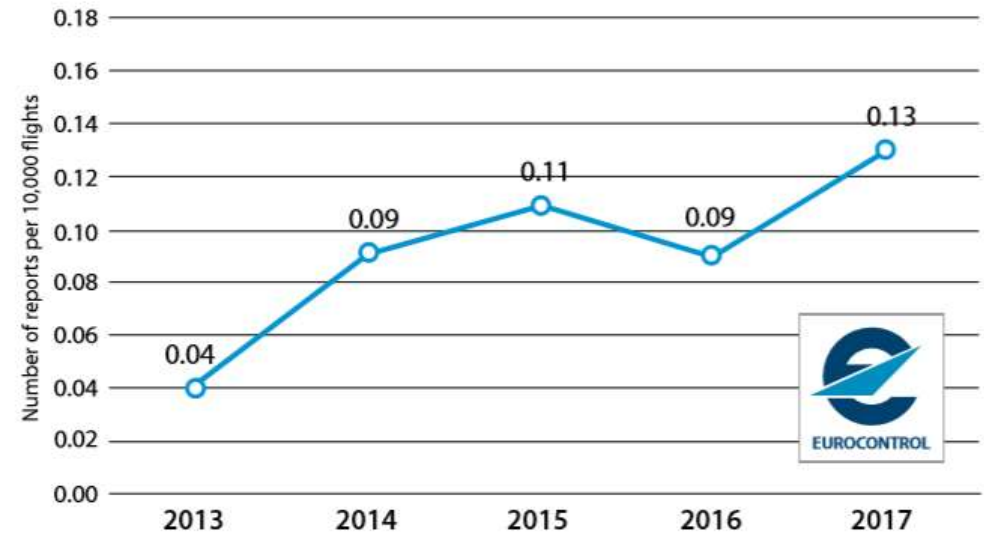
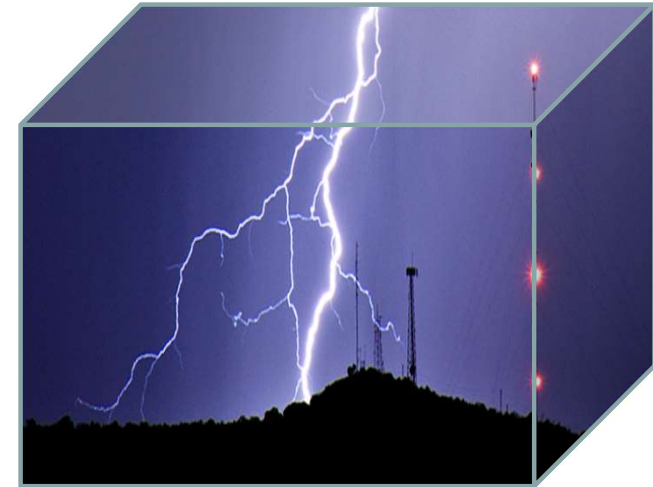
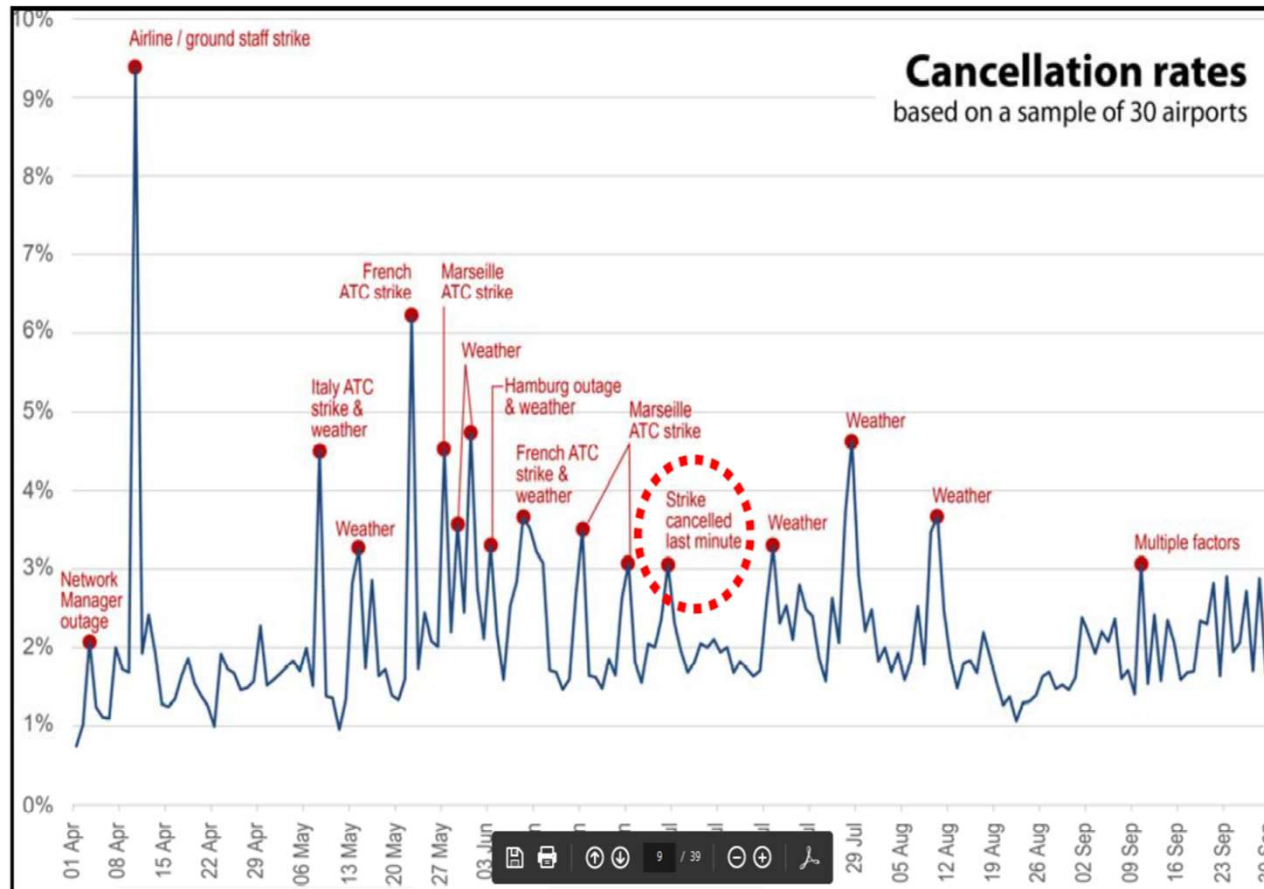


Figure 43: Loss of communication 2013 – 2017



5. Sector Over deliveries, due severe weather



6. CPDLC Time savings – soft capacity !

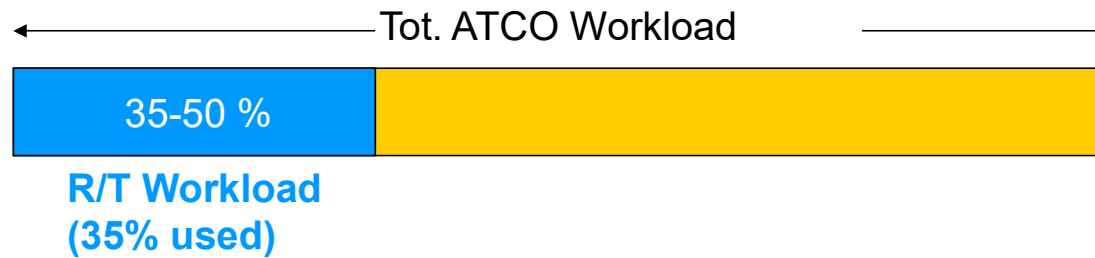
	<u>saved Freq.Time</u>	2019	2018	Errors?
• 55,3% CONTACT	113 days	655.657	(449.746)	?
• 23,9% ROUTE	50 days	284.369	(177.427)	??
• <u>17,8% LEVEL</u>	<u>24 days</u>	<u>211.155</u>	<u>(150.043)</u>	
• 1,8% SPEED	3 days	21.695	(14.312)	
• 0,6% HEADING	1 day	7.479	(3.679)	
• 0,3% SQUAWK	½ day	4.051	(3.558)	?
• 83 - STUCK MIKE		<u>Priceless!</u>		
Σ	> 6 Month (if copied, at the 1.st time!)			

Operational DL usage / ATC

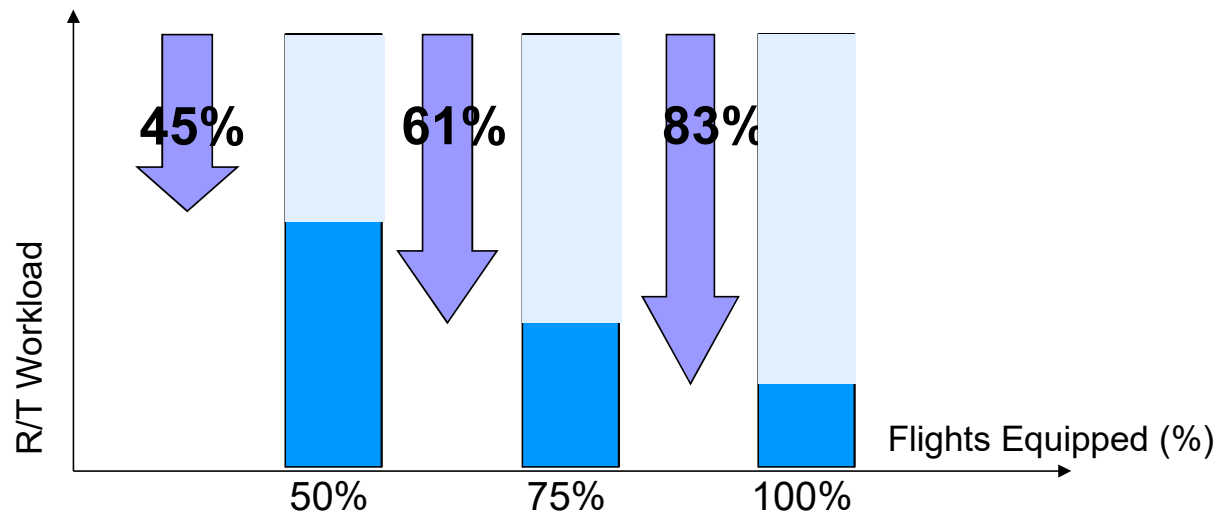
	<u>2018:</u>	<u>2019:</u>	<u>Change:</u>
ATN LOG ON's:	276.306	342.021	+24%
FANS LOG Ons	150.144	150.771	+/- 0 %
Ops Usage:	796.667	989.209	+24%
Avg ATN LOG-ON rate:	28,2 %	(out of 38% filtered / techn. possible)	
FANS	<u>10,4 %</u>		
	■ 38,6 %		

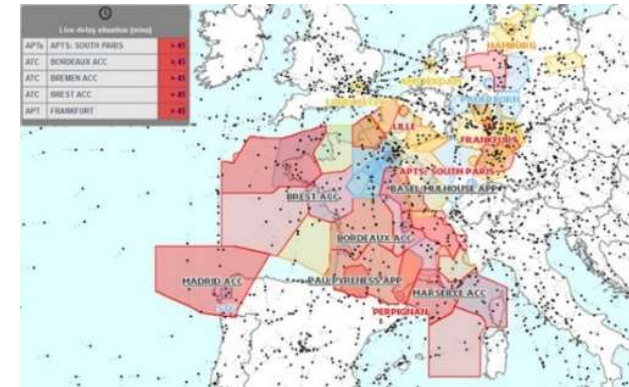
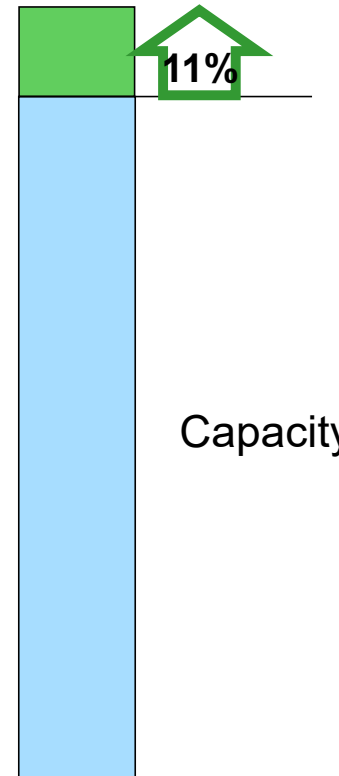


Capacity



- Reduction R/T workload @ differing equipage levels





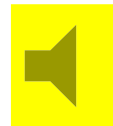
CAPAN simulation experience – capacity increase (aircraft/hour) is half the saved workload

CPDLC operations - SSR UL

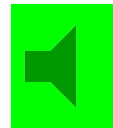
From [Voice exchange]



Via [CPDLC input]



To [Automatic]



Strategic, not *Tactical*

Frequency Management

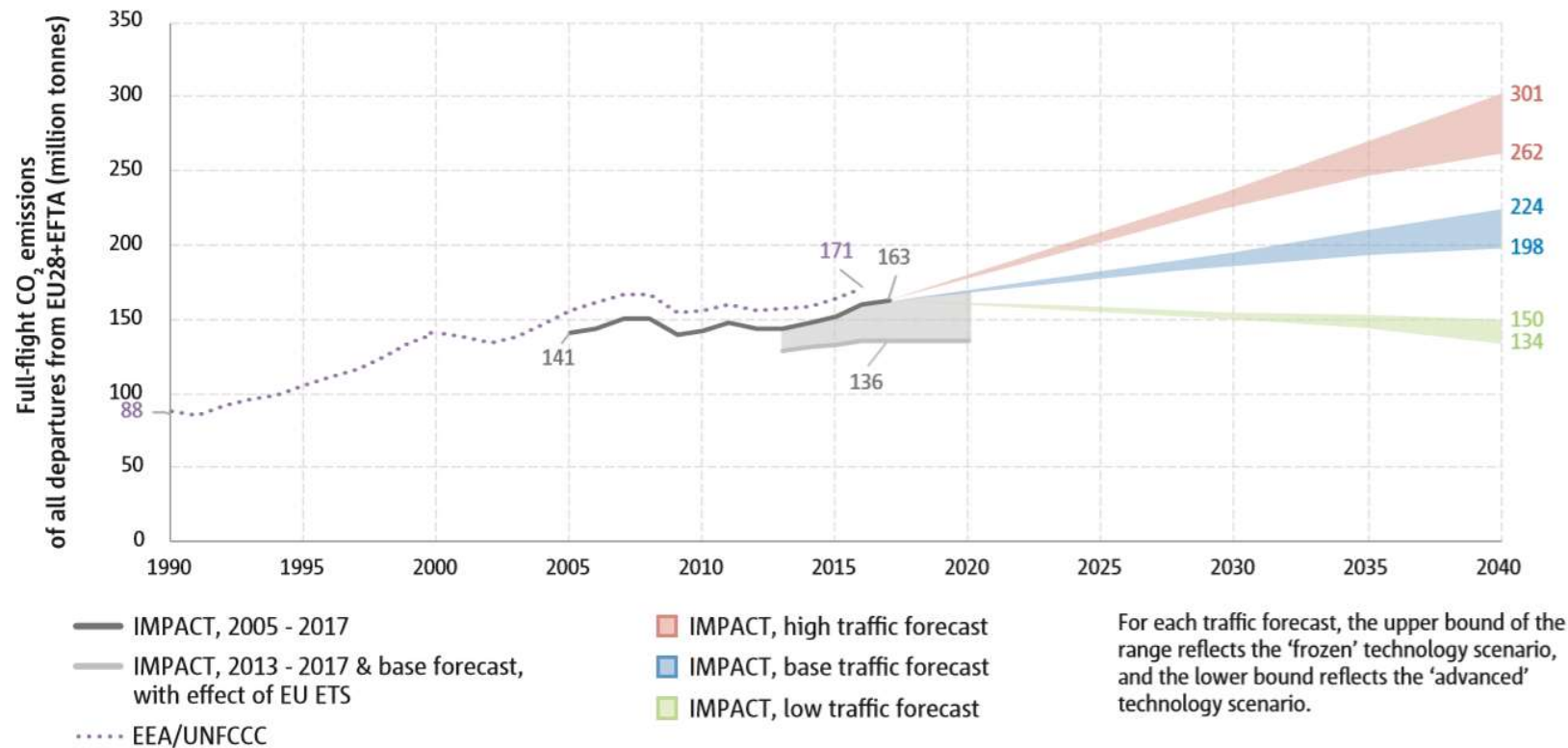
Workload Redistribution

EC/CC Task sharing



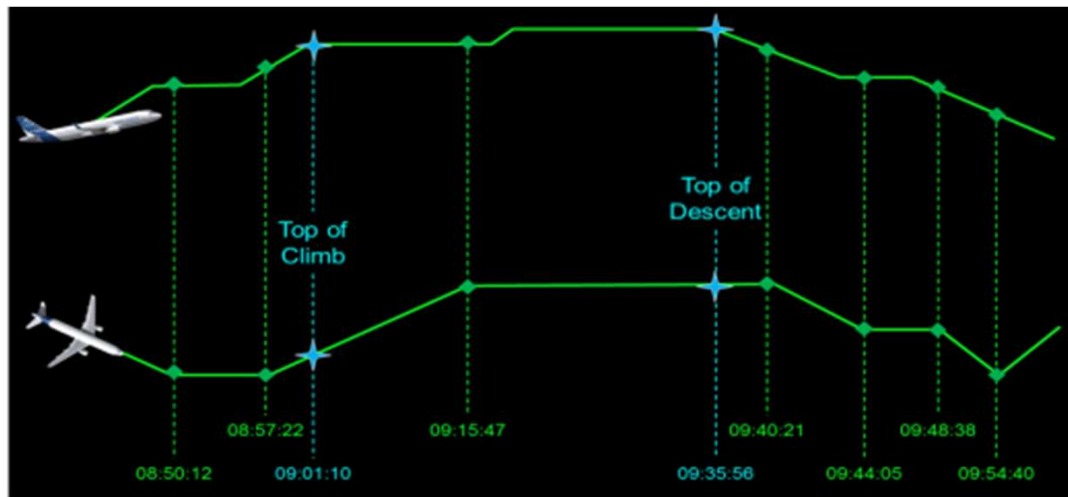
Reduction of CO₂ Emission / Contrails

Figure 1.9 CO₂ emissions are steadily increasing again since 2013



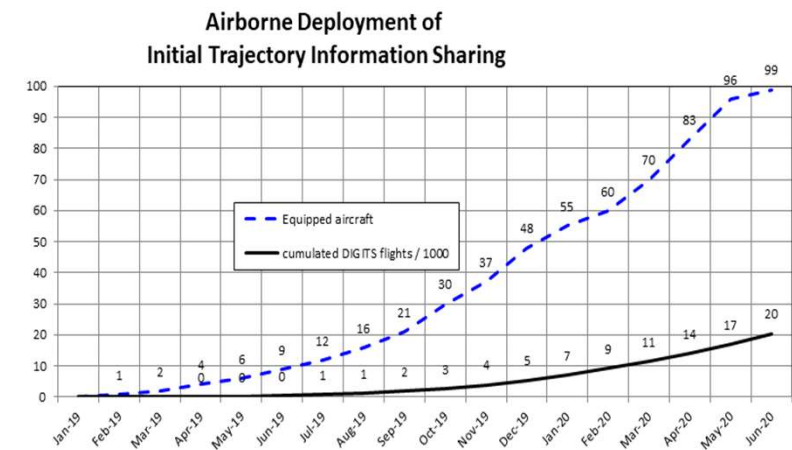
Next IR 716/2014 2025/26 CPDLC ATN Base Line 2

- MUAC CPDLC pre-operational since 2019
- Trajectory Information
- TOC and TOC, CI dependant information



Maastricht UAC's View

- MUAC sees an immediate benefit for safety
- MUAC strongly believes in the future of Trajectory Based Operations (TBO), closing the loop air-ground via ADS-C and the ATN-B2 CPDLC message set
- MUAC envisages many opportunities to improve the ops use and tools, gradual /step-by-step
- MUAC supports with ATN-B2 system Data Link via Satellite trials (IRIS IOC with INMARSAT)



AI Monitor UM120 Monitor/*Stand-by on*

*“Because it was busy the Exx56NY **logged in on CPDLC** and iso calling in sent us ‘Monitoring on 132.205’. **This is very helpful**”.*

- As of **Q1/2020**, UM 120 **Monitor** Up Link, eg. MONITOR [Maastricht-UAC] [132.515].
- Expected **DL replies** from the cockpit for all FANS 2 CPDLC aircraft is **WILCO** and for BL1 aircraft additionally the DM89 **MONITORING** [Maastricht-UAC] [132.515].
- *Asking crews **to stand-by** on the next frequency, and wait until the next ATC sector will initiate VHF coms.*
- To reduce R/T load **of initial calls, to manage the freq. when** busy, to be published in **AIP / NOTAM**.





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