

European Business Case for datalink

DFS approach and preliminary results

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Air-Ground Data Link

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Today's Shortcomings

- **increasing number of aircraft results in**
 - reached capacity limits on voice frequencies
 - overload of executive controllers
- **voice communication implies potential of misunderstandings**
- **no automated exchange of data between processing systems in the Air and on the Ground**
- **Airline requirements regarding data link are not satisfied**
-

DFS Cost Benefit Analysis

- **for each investment decision responsible concept or project manager has to calculate the capital value and find out the implications for ATC charges**
- **performed by an internal (methodical) guideline**
- **considering life cycle and (single) project costs**
life cycle dependent on depreciation time in years (e.g. 15 years)
- **considering benefits**
life cycle only

Assessment Process Steps (1)

- **Description to the effects through the establishment of datalink services for:
all air traffic partners (*airlines, airports and ATS*)**

- **going into detail for ATC**
 - **operations (*procedures, workload effects*)**

 - **infrastructure (*impacts on products of CNS/ATM domains*)**

 - **identify cost and benefit factors**

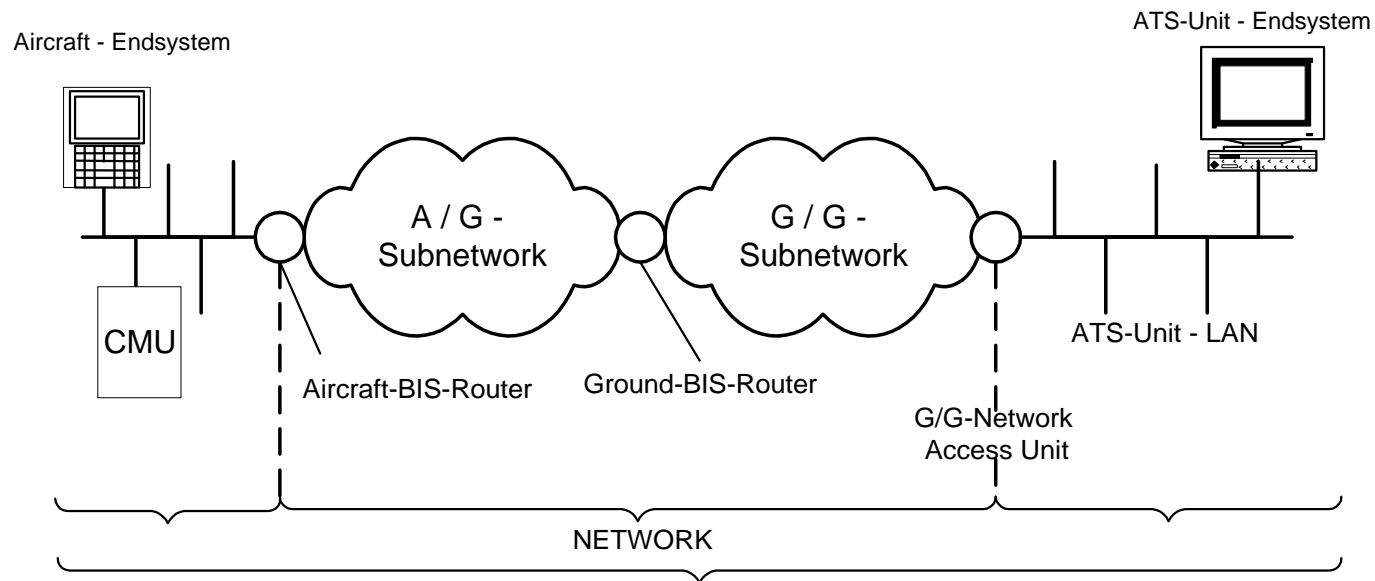
Assessment Process Steps (2)

- **classification of factors**
 - **monetary effects or**
 - **non-monetary effects**

- **monetary effects (costs and benefits)**
into a relation: gives a cost-benefit-ratio,
a calculation gives the capital value (*discounted cash values*)
and the implications for ATC charges

- **non-monetary effects will be assessed by a group of experts, performs a benefit value analysis**

End-to-End Transmission Path*



CBA has to be based on Overall System Elements

* Source: Eurocontrol-Study COM.ET2.ST15

DFS - CBA: Cost Factors

improvements and life cycle costs (status: preliminary)

? Aircraft	~ 400 kEuro per a/c *
→ Network (A/G and G/G)	~ 16 MEuro * VDL M 2 ~ 18 MEuro * VDL M 4
→ ATS Unit	
ATM Center Systems	> 31 MEuro
ATM Tower Systems	> 10 MEuro
→ Total Costs	> 75 MEuro + > 100 MEuro 250 a/c

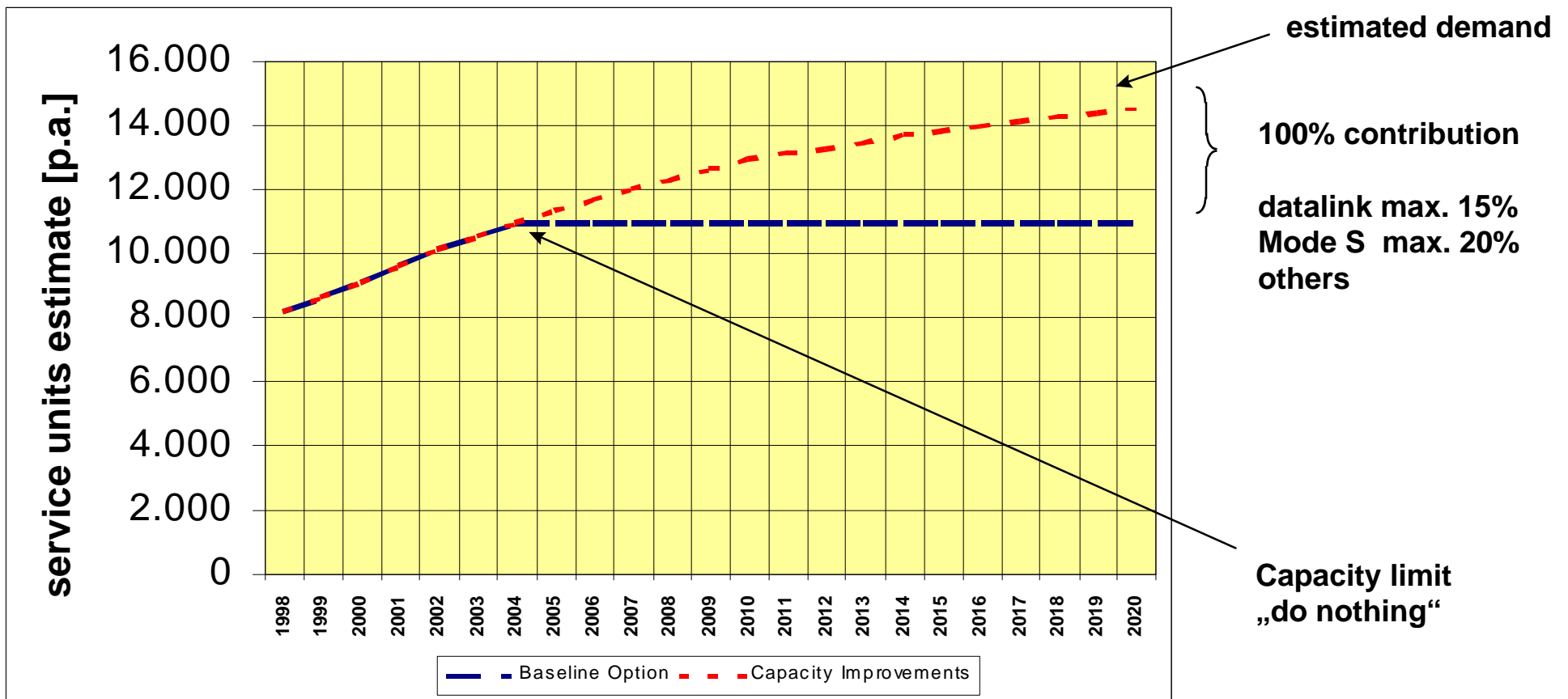
* Source: Eurocontrol-Study COM.ET2.ST15; VDL Mode 2

DFS - CBA: Benefit Factors

life cycle years only (status: preliminary)

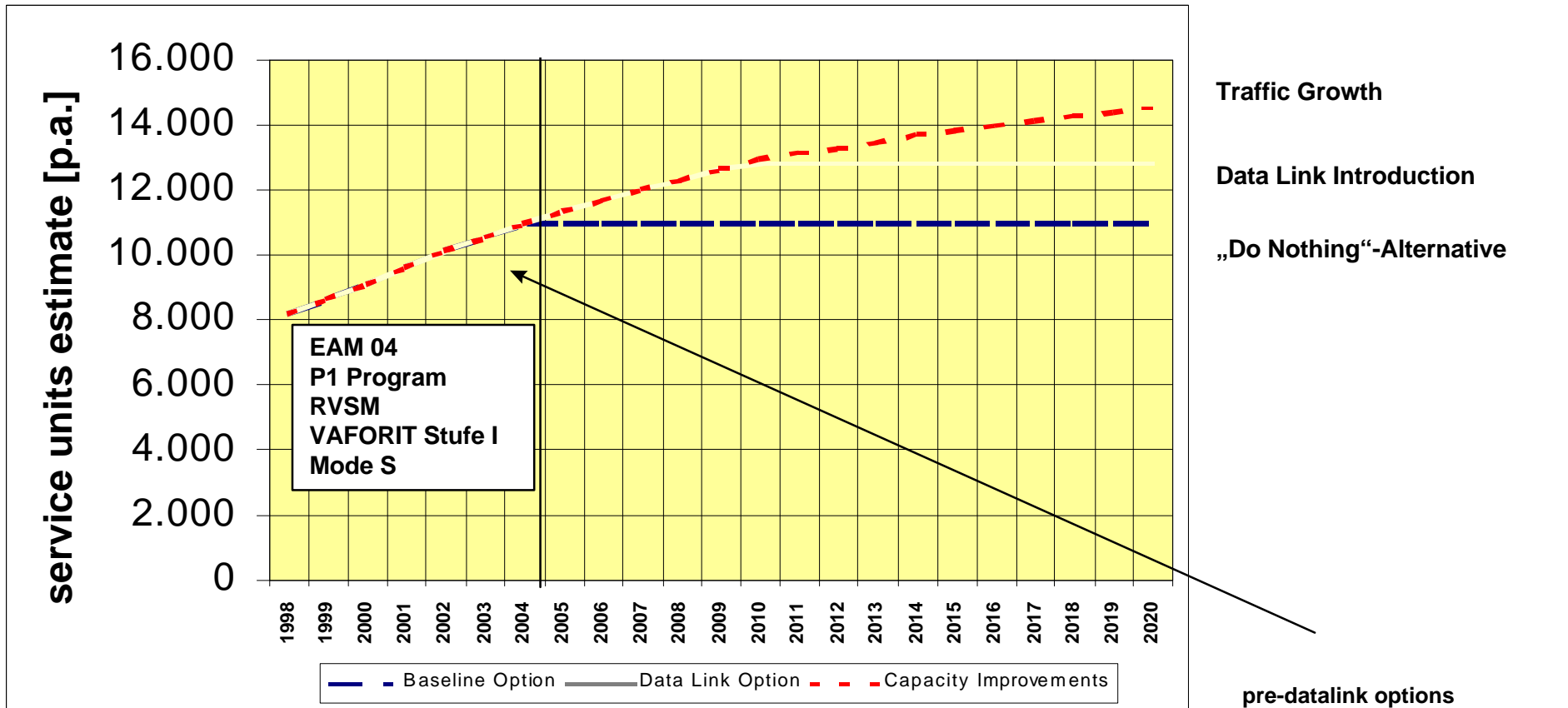
→ contribution to capacity enhancements

upto 15 percent



Cost-Benefit Assumption

Requirement driven Capacity Plan



- EAM 04 - european airspace model
- P1 Program - integrated ATM centre system (flight data, radar data and information data processing)
- RVSM - reduce vertical separation minima
- VAFORIT - very advanced funtional operational requirements implementation
- Mode S - introduction of Mode S

Cost-Benefit-Analysis

Results

- The calculated expense limit equals 216 Mio. DM (cost-benefit-ratio 1:1)
- Roughly estimated expenses for the implementation and operation of data link services are above 100 Mio. DM (discounted).
- The risk* of this estimation is as high that **the introduction of Data Link Services** can not be justified by economic reasons.**

* At the moment there are very few reliable sources of monetary information regarding costs and benefits.

** There was no individual investigation particular to singular data link services.

Summary

- **The Cost Benefit Ratio could not be finally calculated.**
There are a lot of currently unknown factors in the equation.
This leaves the risk, that the figure will not justify the need.
 - **? The introduction of Air-Ground Data Link Services could not only be justified by a cost benefit analyses.**
- **Airspace capacity shortages are expected when Data Link Services are not introduced before 2006.**
- **DFS customers requesting Data Link Services today, in order to enhance and improve the overall quality of the ATC Services.**

Non-Monetary Benefit Analysis

	Reduction			Implications			
	Controller	Pilot	Frequency	capacity	safety	Trajectory- prediction	Service Quality
Introduction Phase 0 (asap)	D-ATIS (INDAL)	+	++			++	++
	D-DCL (INDAL)	++	+	+++	+	+	++
Phase 1 (from 2005)	CPDLC (DCL, CIC not time critical)	+	+	++	+	+	+
	D-FIS (D-OTIS, D-SIGMET)					+	+
	ADAP (CAP, SAP)	+	+	+			+
	FLIPCY	+	+	+		++	
Phase 2 (from 2007)	CPDLC (CIC) (time critical)	+	+	+	+	+	+
	ADAP (PPD, ADS)			+	+	+	+
	D-FIS (D-RVR)					+	+

Conclusions (1)

Data Link Services

There is a strategic requirement to introduce Air- Ground Data Link services within DFS controlled airspace.

Therefore DFS introduces Air-Ground Data Link Services in a phased approach:

**Phase 0 (starting 1999): *Initial Data Link Applications*
(Result of the Projects INDAL- DATIS und -DDCL)**

Phase 1 (starting 2005): non- time critical *Data Link Services*

depending on the operational requirement:

Phase 2 (starting 2007): time critical *Data Link Services*

Conclusions (2)

Data Link Services

- **Data Link Services (main categories only)**

- **Phase 1 (starting 2005):**

- **non- time critical Services**

- CPDLC (DCL, CIC- non time critical)
- ADAP (CAP, SAP)
- D-FIS (D-OTIS, D-SIGMET)
- other Services (z.B. FLIPCY)

- **additional Phase 2 Services (optional starting 2007):**

- **time critical Services**

- CPDLC (CIC-time critical)
- ADAP (PPD, ADS)
- D-FIS (D-RVR)
- other Services.

Conclusion (3)

Air-Ground Data Link Media

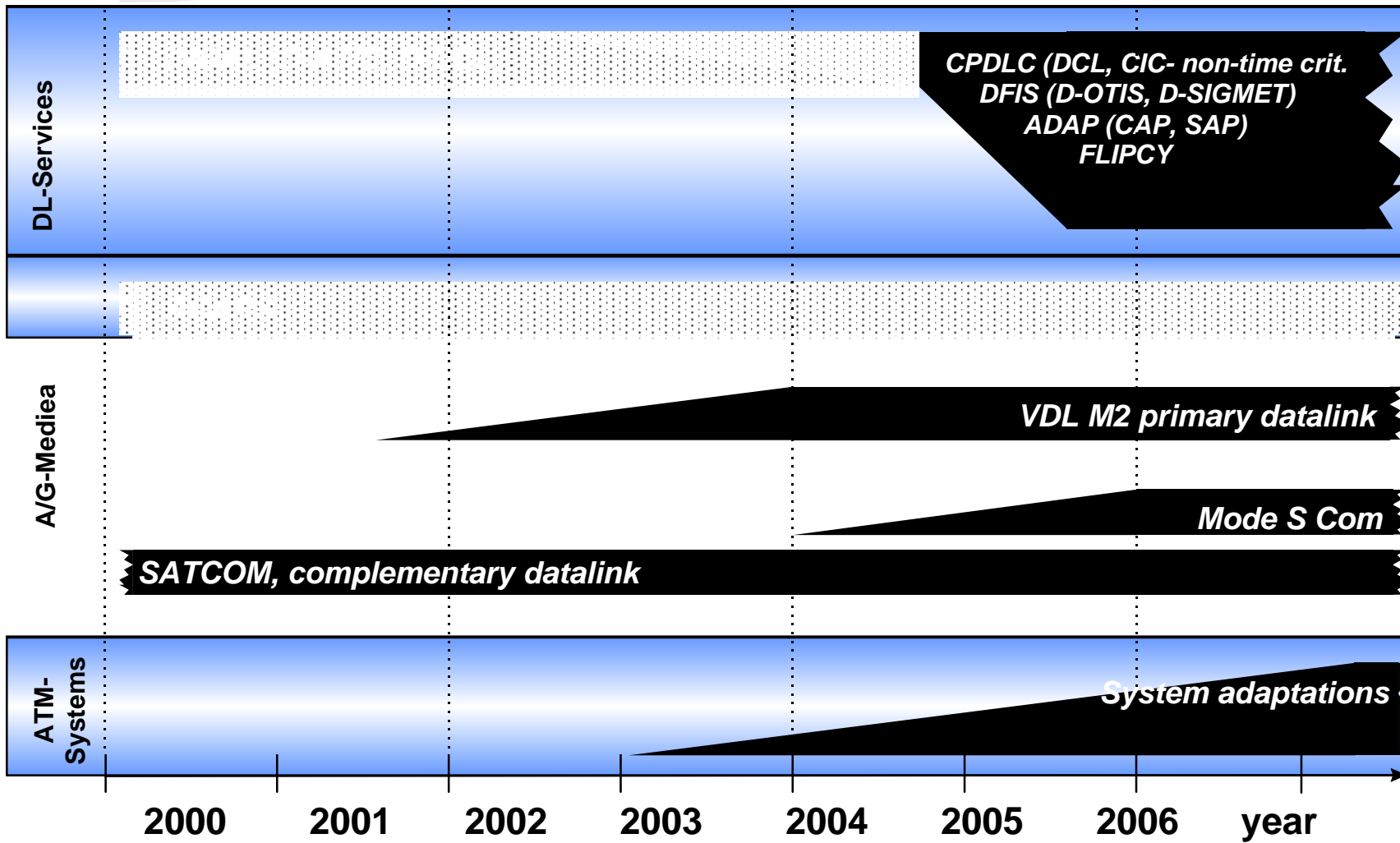
- **Non- time critical ATS Data Link- messages will use VDL M2 (medium timeframe, starting 2005)**
- **The need and the type of a “complementary Data- Link Media” (in addition to VDL M2) needs to be investigated and decided till 2001. In the light of the DFS- decision on Mode S Enhanced Surveillance, SSR Mode S communications will get special attentions.**
- **The operational requirement for the use of time critical ATS- Data Link- messages - and if so the type of the media - needs to be defined till 2002.**

Next Steps

- ? Active participation in process and evaluation of the European cost-benefit-analysis
- Implementation of datalink services step by step following via project per service or group of services
- management approvals for implementation conditional on economic efficiency (overall system elements per service)

Implementation Scenario Phase 1 (from 2005)

Non-Time Critical Services



**Alternative Media
(Selection of complementary media by 2001)**

Implementation Scenario Phase 2 (from 2007)

Time Critical Services

