The G-PAT Tool

Global Operational Data Link (GOLD)

Familiarization with Performance Based Communications and Surveillance (PBCS) Workshop

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Overview

➤ The United States has developed software to aid ANSPs in the task of post-implementation monitoring

➤ This software – the GOLD performance analysis tool (G-PAT) – helps the user perform graphical analysis to assess the performance of the data link system in their respective airspace in relation to the RCP/RSP specifications for TIME / CONTINUITY

➤ The G-PAT is written in java script and has a graphical user interface (GUI) which can be run on a MS Windows-based personal computer

Purpose

➤ The G-PAT is used to create charts to measure:

- CPDLC performance against the required communication performance (RCP) 240 or RCP 400 criteria

  - actual communication performance (ACP)

  - actual communication technical performance (ACTP)

  - pilot operational response time (PORT)

- ADS-C downlink latency performance against the required surveillance performance (RSP) 180 or RSP 400 criteria

How it works

➢ The user inputs CPDLC or ADS-C performance data in the format described in Appendix D of the GOLD

➢ The user then selects:

- the desired analysis filters, e.g. media type or operator

- the performance measure being analyzed, e.g. ACTP

- the performance criteria based on the data type and the media type

  - CPDLC – RCP 240 for satellite, VHF media or RCP 400 for HF media

  - ADS-C – RSP 180 for satellite, VHF media or RSP 400 for HF media

➢ The tool then creates the cumulative distribution for the selected performance measure and generates the reports and charts selected by the user

GPAT and Data Filtering CPDLC
PBCS Manual Filtering Requirements Summary

➢ Prior to using G-PAT, the input data will require pre-filtering to conform to the requirements specified in Appendix D of the GOLD.

➢ The CPDLC input data should be filtered according to the following:

- The raw CPDLC transaction data should contain only uplink CPDLC transactions that end with a "WILCO" response (DM 0). Any transactions that end with any response other than "WILCO" should be filtered out.

- All uplink transactions with an uplink initiation message containing elements UM 79-84, UM91-92, UM 116-123, or UM169 should be filtered out.

- All uplink transaction occurring during an outage as reported by one of the data link service providers (DSP) should be removed.

- G-PAT will automatically filter out any records containing uplink transactions with a negative ACP, ACTP or PORT. The records removed from the analysis by G-PAT will be written to a file with a filename that is the same as the input file with the addition of "_R" to the end.

GPAT and Data Filtering ADS-C
PBCS Manual Filtering Requirements Summary

➢ The ADS-C input data should be filtered according to the following:

➢ All ADS-C downlink messages occurring during an outage as reported by one of the data link service providers (DSP) should be removed.

➢ G-PAT will automatically remove duplicate ADS-C messages and messages with a negative estimate for latency.

➢ In addition G-PAT will remove any records with a media type that is not recognized, e.g. "S". The records removed from the analysis by G-PAT will be written to a file with filename that is the same as the input file with the addition of "_R" to the end.

Loading the Data
G-PAT Manual Chapter 4

➢ To load the CPDLC or ADS-C input data, the user can either select File > Open from the pull-down menu of the main toolbar or click on the icon in the top right corner of the application below the main toolbar. The user then selects the directory and file containing the data to be analyzed.

- The input data must be in a comma separated format following the data field structure described in Table 1 for CPDLC data or Table 3 for ADS-C data.

➢ If the data does not contain the required "COMTYP" field, G-PAT will display a message alerting the user and requesting further action, as explained in sections 2.4 and 2.5.

➢ Once the data has been loaded, G-PAT automatically generates a generic GOLD chart for the aggregate data and labels the tab "Figure 1."

Load a CPDLC File

- Run the G-PAT Java Script
  - Click on GPATv3
- Load a data file
  - Click "File"
  - Select "Open" in the dropdown menu
 - Select "ADS_Jan2013_gpat.txt (Double-click filename)
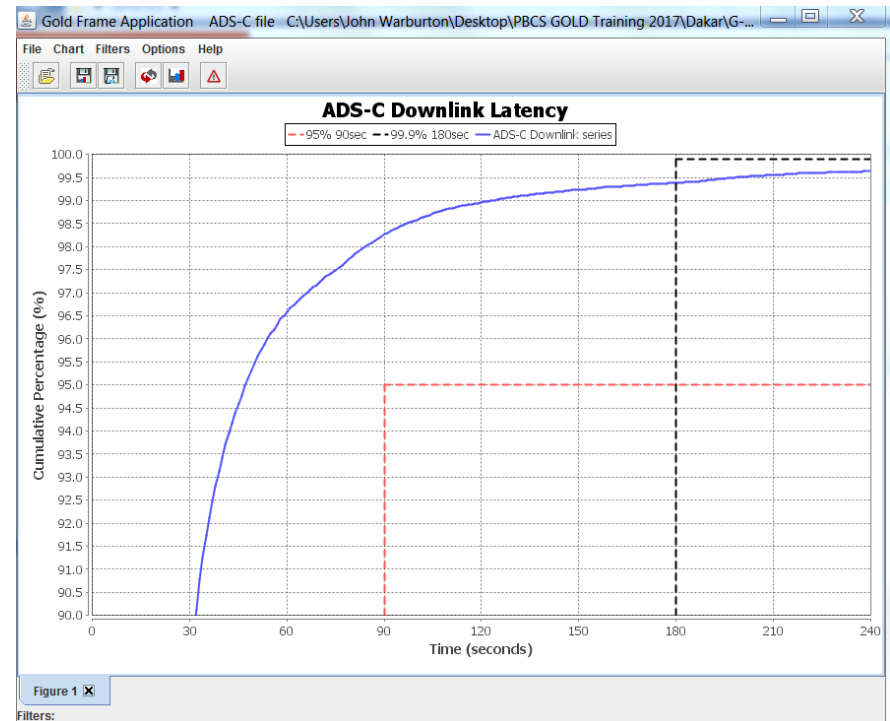
Performance Parameter and Criteria
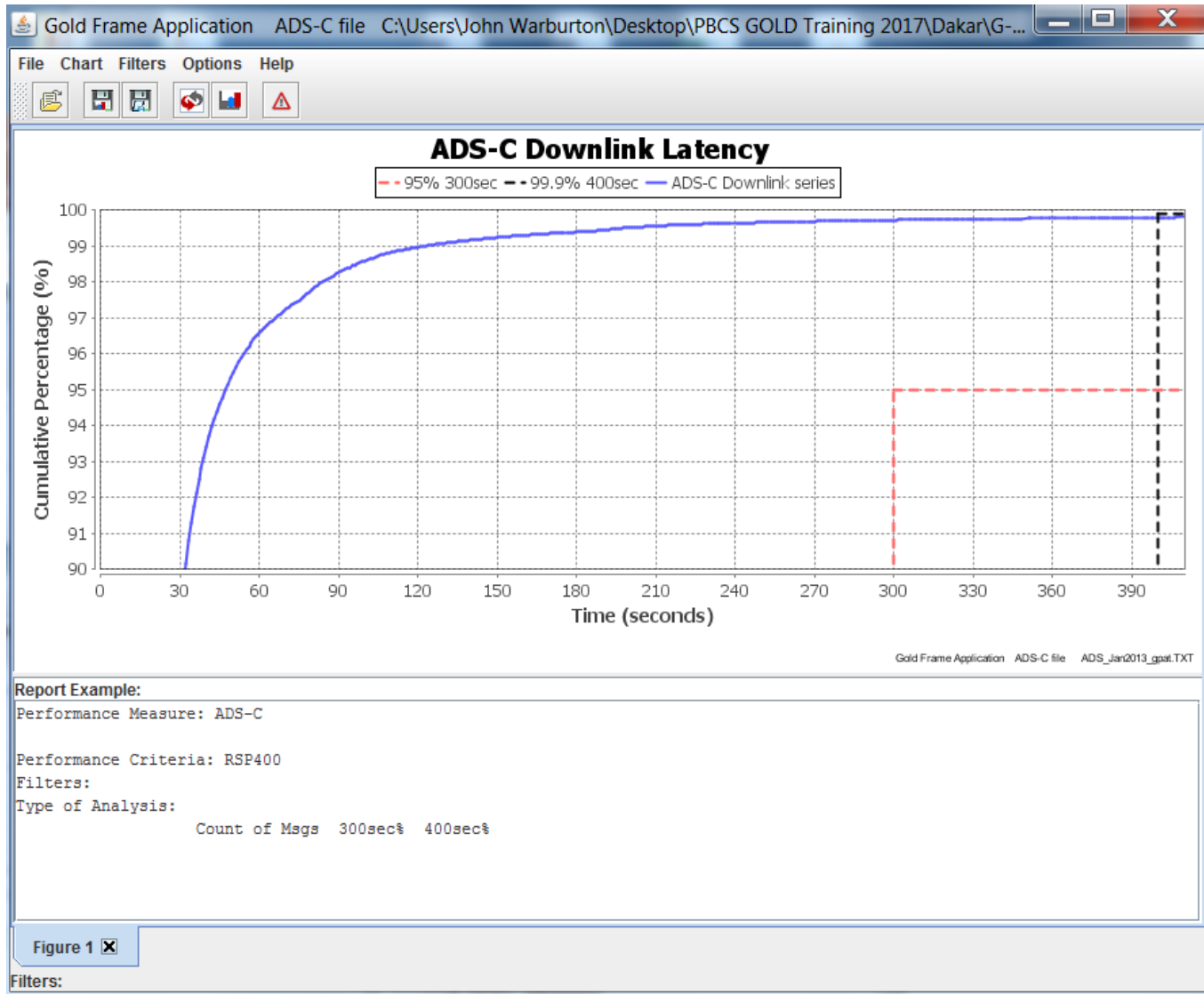## G-PAT Manual Chapter 5

➢ Once the data is loaded the user will click on "Chart" in the main toolbar.

- • If the input data is ADS-C there is only one option available (ADS-C), and all other options will be grayed out.
- • If the input data is CPDLC, the user will select the performance parameter of interest: ACP, ACTP or PORT. Similarly, ADS-C will be grayed out.

➢ Once the performance parameter is selected another box will pop up displaying the available performance criteria. For CPDLC parameters the options will be RCP 240 or RCP400 and for the ADS-C parameter, the options will be RSP180 or RSP 400.

Change Chart Type

➢ Change the scale from 240 to 400

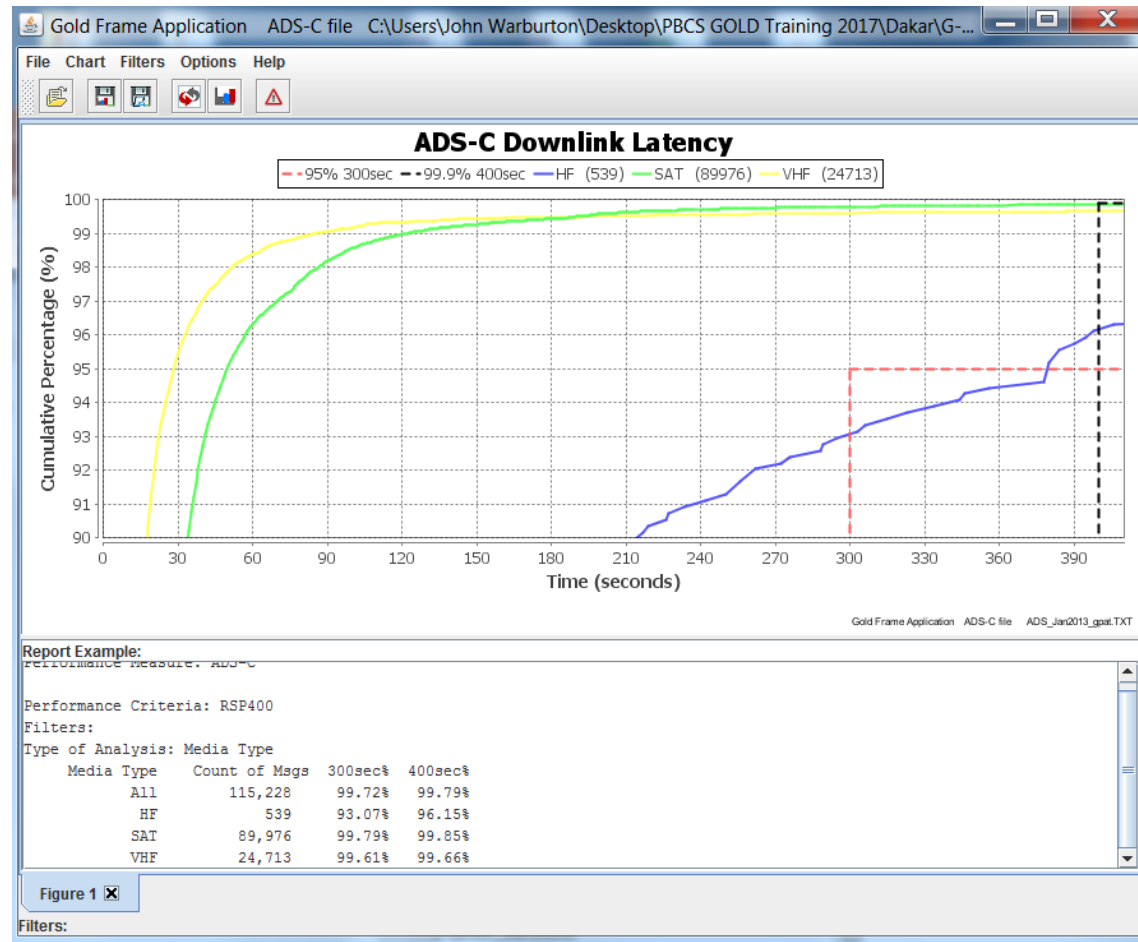➢ "Refresh" the chart and select all data
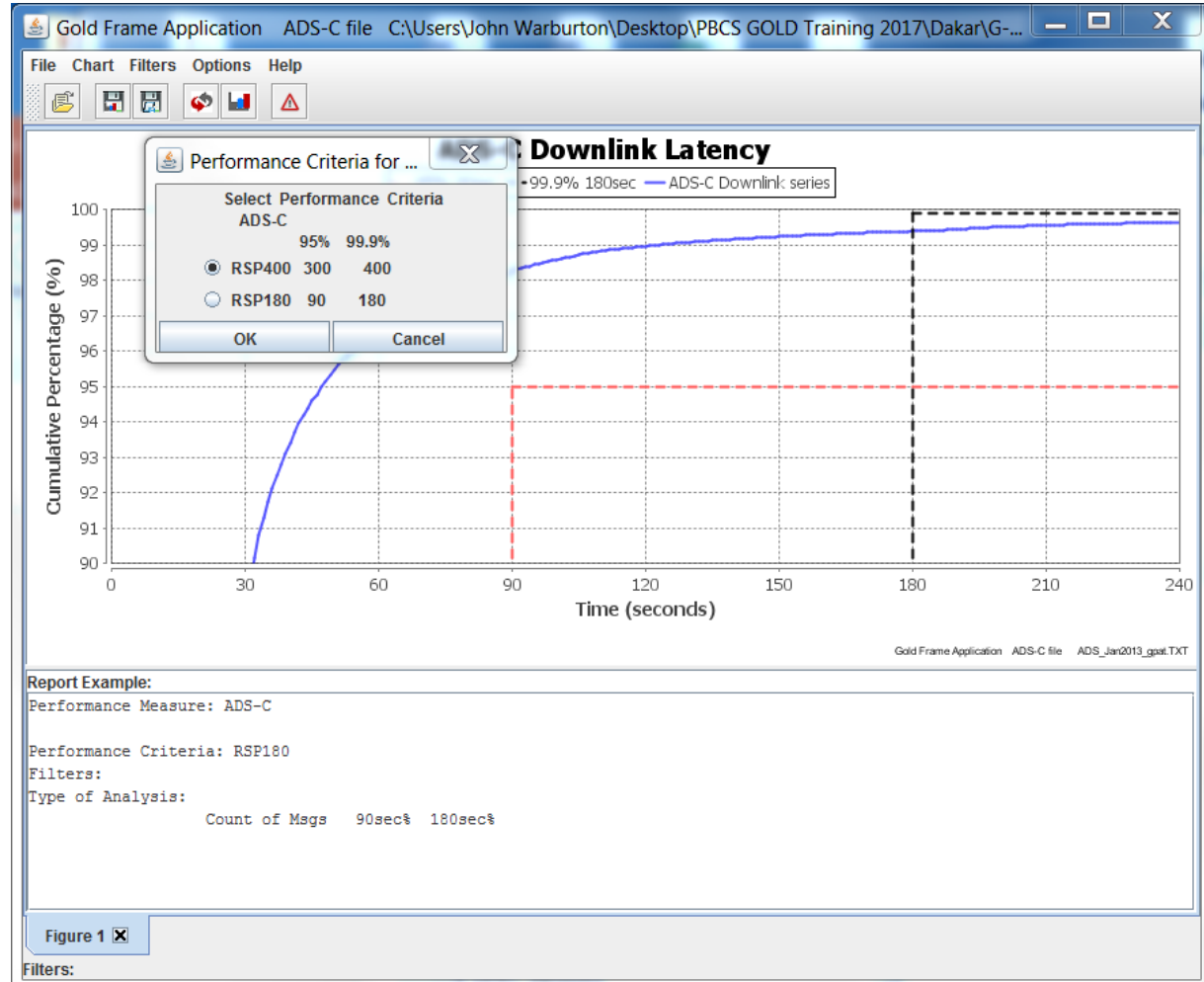
RSP400 Scale

Separate by Media Type

- ➢ Click Refresh
- ➢ Click Media Type
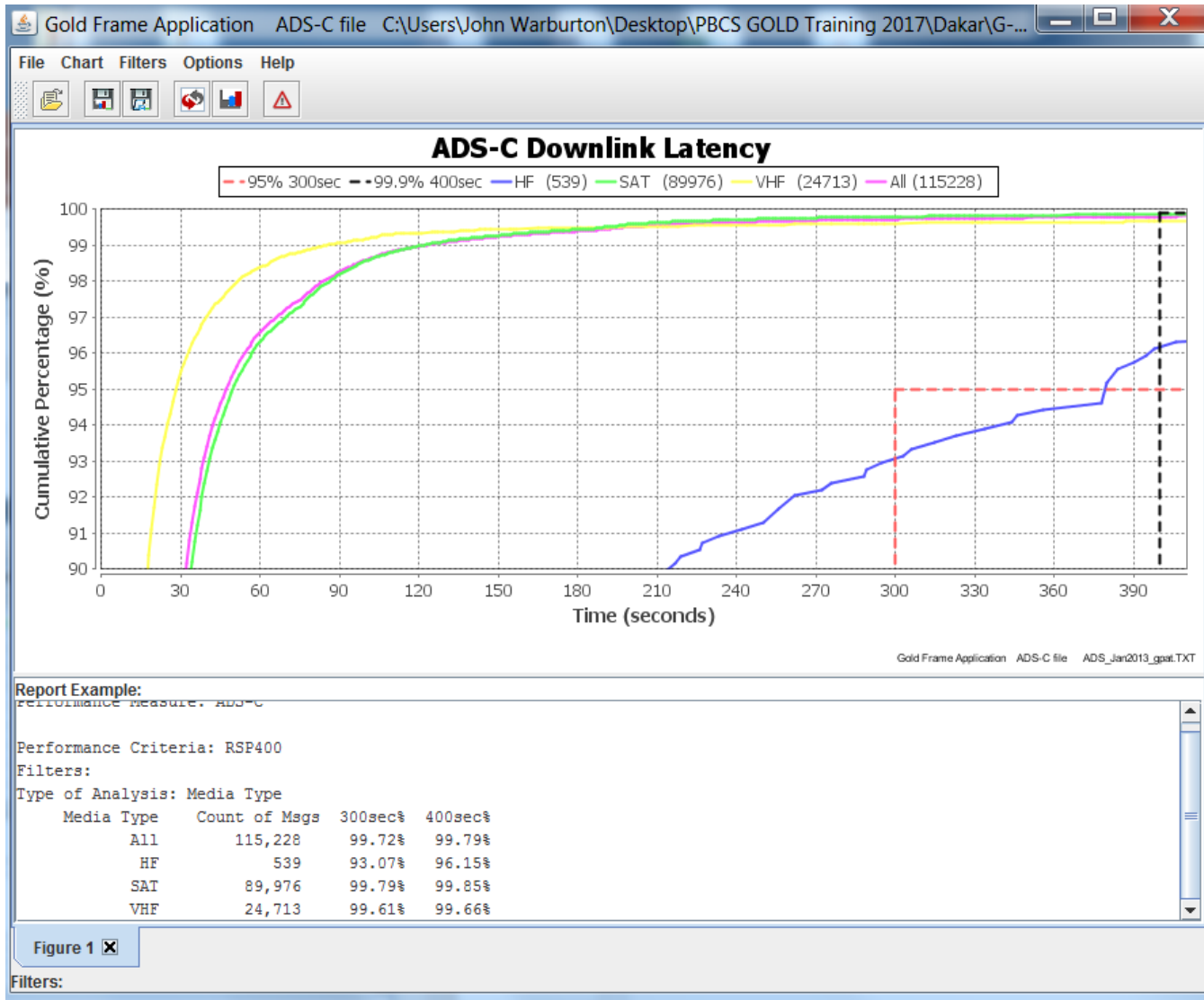- ➢ Select all three
- ➢ Click OK

- ➢ Click Options
- ➢ Selection "Add Aggregate on Chart" and refresh

ADS-C With Aggregate

Filtering the (loaded) Data
G-PAT Manual Chapter 6

➢ If the user would like* to apply any additional filters to the data, the user will select "Filters" from the main toolbar. The following types of filters are available:

- Month
- FIR (flight information region)
- Media Type (SAT, VHF, HF, etc.)
- GES (ground earth station)
- Operator
- Aircraft Type

*This is useful for limiting the full set of aggregate data

➢ Within the "Filters" pull-down Menu, the number of options available for each filter type within the data set is shown next to the name of each filter type.

Filtering the Data

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➢ Within the "Filters" pull-down Menu, the number of options available for each filter type within the data set is shown next to the name of each filter type.

Select Only One Operator

➢ Click Filter

➢ Click Operator

➢ Click "Sort by count"

➢ Click DeSelect All

➢ Click UAL

➢ Refresh Plot (All data)

➢ Refresh Plot (Media Types – Select all three)

- Note the reduced counts

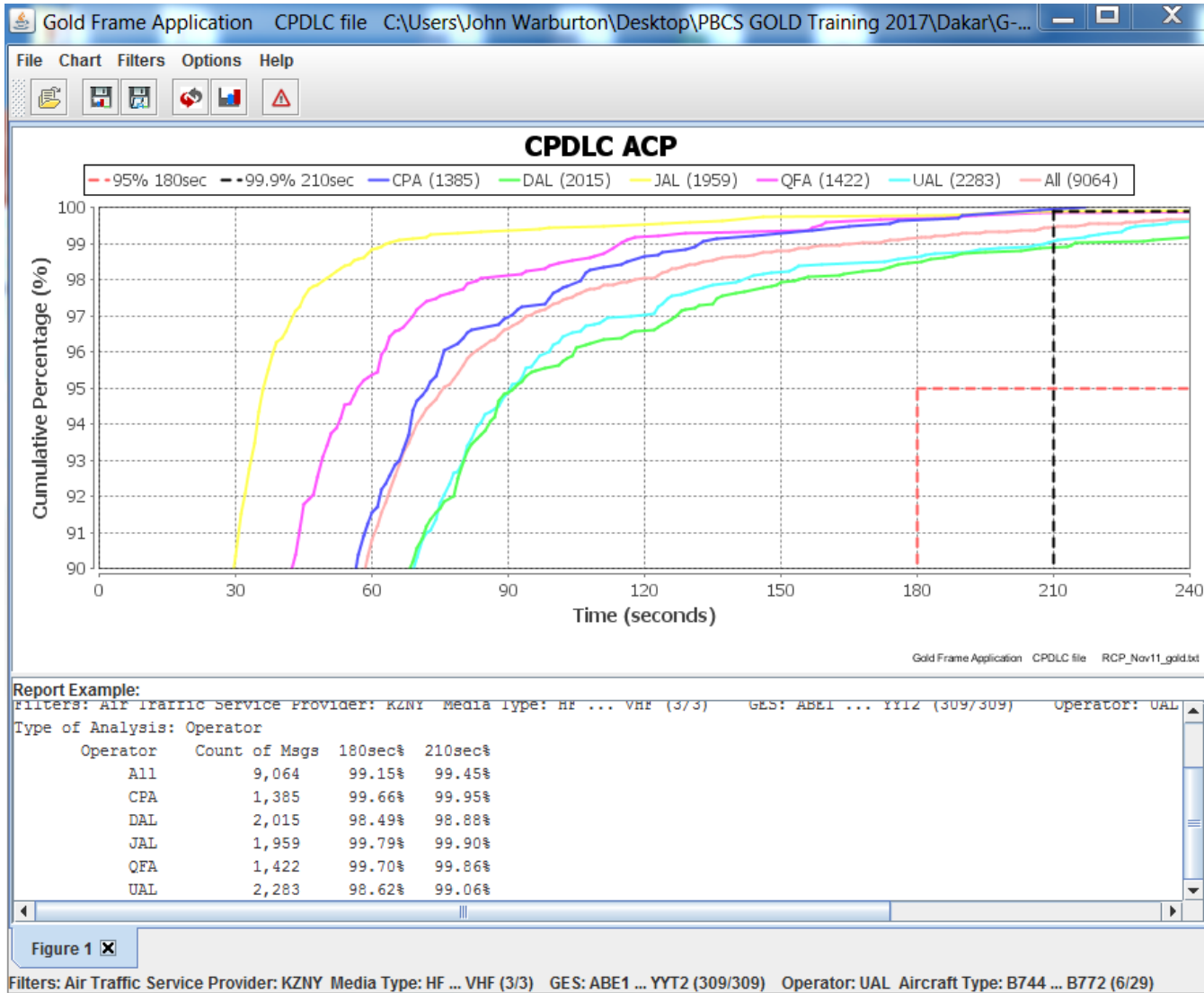# Plot of One Operator

Load New CPDLC Data File

- ➢ Click File

- ➢ Select Open

- ➢ Double Click file icon next to RCP_Nov11_gold.txt

- ➢ Create a CPDCL ACP CDF using only the operators with the top 5 most samples

Top 5 Sampled Operators

Summary and Questions

➢ Someone Please Request A Plot??

➢ G-PAT provides a stand-alone tool to process PBCS data files created according to 9869 Appendix D

➢ G-PAT also creates data plots as described in Appendix D

➢ G-PAT was created to help other monitoring organization gain experience with PBCS and the standard analysis plots, so please use it!