

Web-Based Surface Metering Display (SMD) User Manual

Airspace Technology Demonstration 2 (ATD-2) Team

POC: Lindsay Stevens

Authors:

Louise Morgan Ruszkowski

Amanda Gower

Isaac Robeson

Abstract

This document serves as a manual for the ATD-2 Web-Based Surface Metering Display (SMD). It describes the elements of the full SMD interface and provides explanations for how to interact with the SMD.

The document provides instructions for selecting the type of metering, entering specific metering parameters, and setting excess queue time variables. There are instructions for submitting system feedback and bug reports, as well.

This document also includes information to provide guidance in how to check the current metering state on other components of the ATD-2 system, via either the STBO Client or the RTC/RMTC.

Table of Contents

Abstract	2
Table of Contents	3
1 Getting Started	4
2 Web-Based Surface Metering Display (SMD) Interface	6
2.1 Metering Parameters Page	7
2.1.1 Settings Table	7
2.1.2 Resource Tabs.....	7
2.2 Excess Queue Time.....	16
2.2.1 SMP Table.....	16
2.2.2 Resource Tabs.....	21
2.3 Feedback.....	24
3 Check Metering State.....	27
3.1 STBO Client.....	27
3.2 RTC/RMTC.....	28
Appendix A: SMD Metering.....	29
A.1 Tactical Metering Nuances.....	29
A.2 Strategic Metering Nuances	29
Appendix B: Acronyms.....	31

1 Getting Started

The one-pixel wide green bar (Figure 1) provides access to a number of different system views. To get started, first make sure that the correct desktop is displayed (see Figure 1).

To access the correct display:

Step 1: Hover over the green bar to populate the menu.

Step 2: Select 'My Desktop' from the top of the menu to access the correct display.

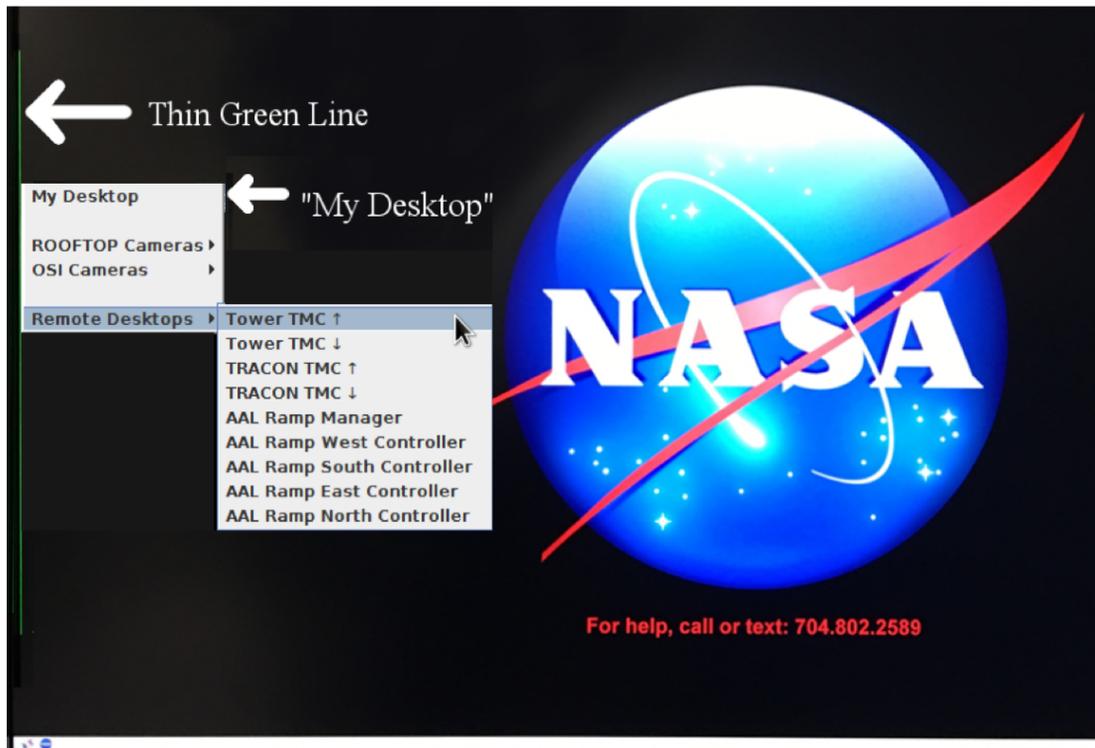


Figure 1. Use the green bar tool to navigate to 'My Desktop'.

To launch the Web-Based Surface Metering Display (SMD):

Step 1: Make sure both the Surface Trajectory Based Operations (STBO) Client and the Ramp Traffic Console/Ramp Manager Traffic Console (RTC/RMTC) are launched and running. If not, follow steps 2-4 to select and load each of those programs, prior to following these steps for the SMD.

Step 2: Click on the NASA icon on the bottom left corner to launch the menu on the toolbar (Figure 2).

Step 3: Select the option for the Web-Based Surface Metering Display.

Step 4: Wait for the SMD to load. This may take a few minutes.

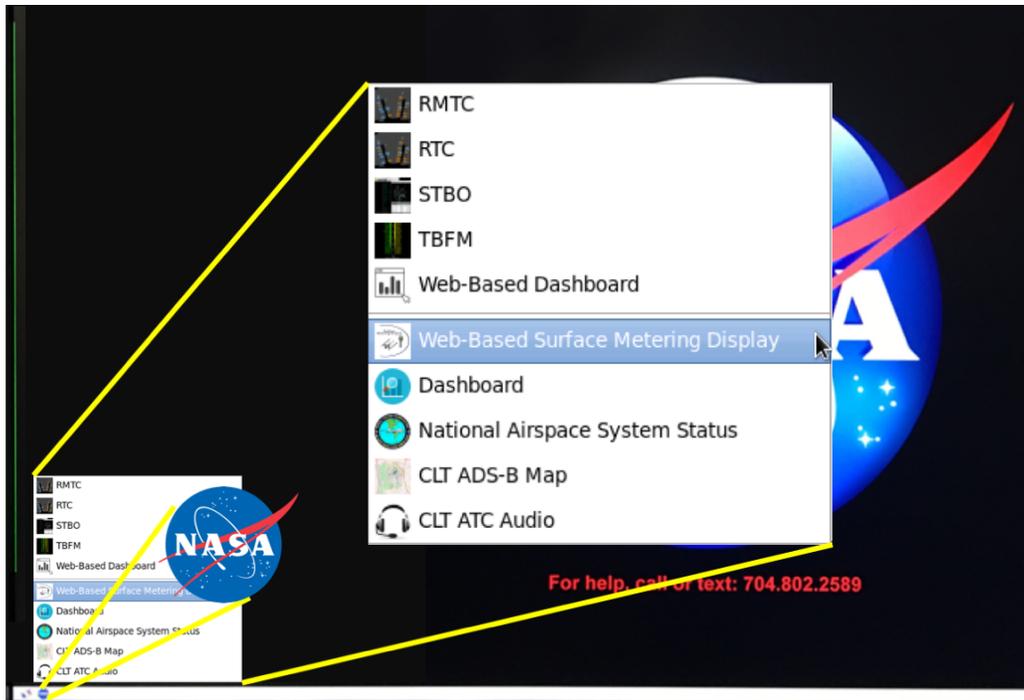


Figure 2. Loading Web-Based Surface Metering Display (SMD).

2 Web-Based Surface Metering Display (SMD) Interface

This section describes the ATD-2 surface metering capability and the elements of the SMD main interface (see Figure 3). With the release of ATD-2 software version 4.0.0, metering was switched from the tactical mode used in previous versions to the newly implemented strategic metering mode. At that time, all NASA meatballs were set to point to the strategic metering links.

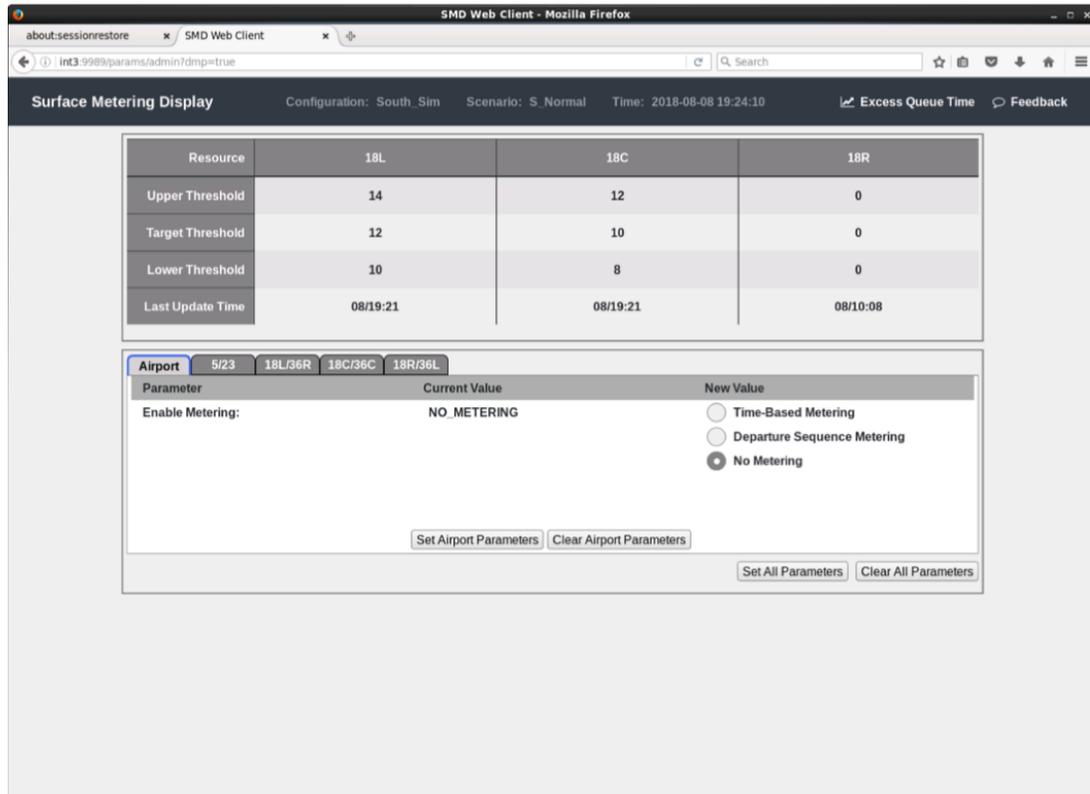


Figure 3. The initial SMD interface window.

Several status icons and buttons are shown in the center of the toolbar along the top of the SMD window. ‘Configuration’ specifies the airport configuration currently in use; ‘Scenario’ identifies the current runway utilization; and ‘Time’ displays the current date and time.

To the right of the icons, there is a toggle option for switching between the Metering Parameters page and the Excess Queue Time page. Different information and options will appear in the SMD window, depending on which page is selected. Details of these two options are discussed in sections 2.1 and 2.2. To toggle between the two page options:

Step 1: If currently on the Excess Queue Time page, ‘Metering Params’ will display in the toggle option in the toolbar.

Step 2: Click on the ‘Metering Params’ toggle option on the right side of the SMD’s toolbar. The window will now display the Metering Parameters page and the toggle option will now display ‘Excess Queue Time’ (Figure 3).

Step 3: Click the ‘Excess Queue Time’ toggle option. The window will now display the Excess Queue Time page and the toggle option will now display ‘Metering Params’.

On the far right side of the toolbar is a ‘Feedback’ button, which is used to access the feedback form. This serves as a simple access point to submit immediate feedback on the SMD system, discussed further in section 2.3.

2.1 Metering Parameters Page

The primary information and selectable options for the Metering Parameters page as it initially appears is shown above in Figure 3. The top half of the page shows the current settings for Target Excess Queue Time (TEQT) and upper and lower thresholds by airport resource (i.e., runway). The lower half of the page allows for setting the type of metering to be used for the airport, and also setting the associated parameter values either by airport or by runway.

2.1.1 Settings Table

The top half of the Metering Parameters page displays the current setting for target and threshold times for each resource listed, shown in Figure 3. The resources listed are based on the current configuration. The system will look up the departure runways used according to the current airport configuration set in the STBO Client and it will only display those active runways.

The values for ‘Upper Threshold’, ‘Target Threshold’, and ‘Lower Threshold’ are displayed for each runway. Upper threshold is the largest acceptable amount of time that an aircraft could spend in the runway queue. The target threshold is the TEQT, or the desired amount of time for an aircraft to spend in the runway queue. Lower threshold is the least amount of time predicted in the runway queue for which Time-Based Metering is needed. When all aircraft have a predicted time in the runway queue below the lower threshold, the current metering program can end. The ‘Last Update Time’ refers to the time that the parameters in this table were last updated, with date, hour and minutes shown in the format DD/HH:MM.

2.1.2 Resource Tabs

Resource tabs allow changes to be made for the entire airport and/or for individual/paired runways. The contents of each tab are laid out in a tabular format, with ‘Parameter’, ‘Current Value’, and ‘New Value’ headings. ‘Parameter’ identifies the different parameters that may be set; ‘Current Value’ displays the current setting of each parameter; and ‘New Value’ lists the possible parameter options or values that can be altered. This section describes the options and functionality available for each resource tab.

2.1.2.1 Airport Tab

The ‘Airport’ tab provides options for type of metering and associated parameters for the entire airport, including enabling metering, setting lead times for Time-Based Metering, and setting a queue size for Departure Sequence Metering.

For the ‘Enable Metering’ parameter, the default setting is ‘No Metering’. Alternate options include ‘Time-Based Metering’ and ‘Departure Sequence Metering’.

2.1.2.1.1 Time-Based Metering

When operating in Time-Based Metering, the ATD-2 system will predict the need for metering, and then for subsequent gate holds to meet metering criteria. The ATD-2 system will propose new Surface Metering Programs (SMP) for specific runways when the predicted time in queue exceeds the specified upper threshold queue time.

When ‘Time-Based Metering’ is selected, ‘Lead Time’ and ‘Static Time Horizon’ will appear as other parameters. The ‘Current Value’ setting is shown, followed by up/down arrows under ‘New Value’, for selecting different values for these parameters in integer minutes (see Figure 4).

‘Lead Time’ specifies how far in advance an SMP will be recommended. Setting large values for lead time (e.g., 180 min.) will allow the system to function more strategically.

‘Static Time Horizon’ is a new parameter that will be used later in Phase 2. It is set to zero for the start of Phase 2, which will have no effect on the ATD-2 scheduler. Later, experimentation will begin with setting this parameter to larger values to support airlines that want to leverage surface metering. The static time horizon determines how far in advance the scheduler will automatically freeze the flight's TOBT and gate hold. Set to zero, the scheduler freezes the flight's TOBT when the flight calls ready for pushback. Functionality has been recently introduced into RTC that will allow the selection of individual flights to freeze in advance of the flight calling ready. The static time horizon will do this automatically for all flights, so that an airline can start leveraging the gate hold for additional benefit (e.g., letting a connecting passenger that previously would have barely missed the flight to instead catch the flight). But freezing TOBTs in advance also means the scheduler has less flexibility to make last minute changes to the metered schedule to handle very tactical situations. This trade-off is one of the research areas for Phase 2.

To enable Time-Based Metering from the ‘Airport’ tab:

Step 1: Click on the ‘Time-Based Metering’ radio button under the ‘New Value’ heading. The radio button will turn green when selected (see Figure 4) and an orange box will outline the ‘Airport’ tab, indicating that a potential change has been selected but has not yet been Set.

Upper Threshold	0	12	10	0
Target Threshold	0	12	10	0
Lower Threshold	0	6	5	0
Last Update Time	02/08:00	02/08:00	02/08:00	02/08:00

Parameter	Current Value	New Value
Enable Metering:	NO_METERING	<input checked="" type="radio"/> Time-Based Metering <input type="radio"/> Departure Sequence Metering <input type="radio"/> No Metering
Lead Time:	60 min	<input type="text" value="60"/> min
Static Time Horizon:	0 min	<input type="text" value="0"/> min

Figure 4. Selecting Time-Based Metering for the airport.

Step 2: Use the up and down arrows in the text box beside lead time in the ‘New Value’ column to enter a new lead time value, or click in the text box and manually type in a new lead time value. The selected ‘New Value’ for lead time will appear at the right side of the window until the parameter has been Set (see Figure 5).

Target Threshold	0	12	10	0
Lower Threshold	0	6	5	0
Last Update Time	02/08:00	02/08:00	02/08:00	02/08:00

Parameter	Current Value	New Value
Enable Metering:	NO_METERING	<input checked="" type="radio"/> Time-Based Metering <input type="radio"/> Departure Sequence Metering <input type="radio"/> No Metering
Lead Time:	60 min	<input type="text" value="180"/> min
Static Time Horizon:	0 min	<input type="text" value="0"/> min

Figure 5. Select a new value for Lead Time in Time-Based Metering.

Step 3: Once the static time horizon is being studied, use the up and down arrows in the text box beside ‘Static Time Horizon’ in the ‘New Value’ column to enter a new value, or click in the text box and manually type in a new value. The selected ‘New Value’ for static time horizon will appear at the right side of the window until the parameter has been Set (see Figure 5).

Step 4a: Click on the ‘Clear Airport Parameters’ button to reject all changes in the ‘Airport’ tab only. Alternately, the ‘Clear All Parameters’ button (below the resource tabs) can be selected to reject all changes across all tabs. When the parameters are cleared, the entries and the orange box around the tab will disappear. **Note** that both ‘Clear’ button options will only revert changes that have not been Set; once the Set button is clicked, the clear button *will not* revert the entries to the previous settings.

Step 4b: Click on the ‘Set Airport Parameters’ button to accept all changes in the ‘Airport’ tab only. Alternately, the ‘Set All Parameters’ button (below the resource tabs) can be selected to accept all changes across all tabs. When the parameters are Set, the ‘Current Value’ will change to display ‘Time-Based Metering’ and the newly Set lead time, and both the lead time entry under the ‘New Value’ column and the orange outline will disappear.

2.1.2.1.2 Departure Sequence Metering

When operating in Departure Sequence Metering, a value for the target airport queue (total number of active departure aircraft on the airport surface that are in any state between pushing back from the parking gate to pre-runway departure) is selected and displayed on the STBO Client and RTC/RMTC interfaces (see section 3).

When ‘Departure Sequence Metering’ is selected, ‘Target Queue’ will appear as another parameter (see Figure 6). The ‘Current Value’ setting is shown, followed by up/down arrows under ‘New Value’, for selecting a different number of aircraft for the ‘Target Queue’ size.

To enable Departure Sequence Metering from the ‘Airport’ tab:

Step 1: Click on the ‘Departure Sequence Metering’ radio button under the ‘New Value’ heading. The radio button will turn green when selected (see Figure 6) and an orange box will outline the ‘Airport’ tab, indicating that a potential change has been selected but has not yet been Set.

The screenshot shows a software interface with a 'Last Update Time' header containing three timestamps: 08/19:21, 08/19:21, and 08/10:08. Below this is a tabbed interface with tabs for 'Airport', '5/23', '18L/36R', '18C/36C', and '18R/36L'. The 'Airport' tab is active and highlighted with an orange border. The main content area is divided into 'Parameter', 'Current Value', and 'New Value' columns. Under 'Parameter', 'Enable Metering:' is listed with a 'Current Value' of 'NO_METERING'. The 'New Value' section contains three radio buttons: 'Time-Based Metering' (unselected), 'Departure Sequence Metering' (selected and highlighted with a green dot), and 'No Metering' (unselected). Below this, 'Target Queue:' is listed with a 'Current Value' of '15 aircraft' and a 'New Value' input field containing '15 aircraft' with up/down arrows. At the bottom, there are four buttons: 'Set Airport Parameters', 'Clear Airport Parameters', 'Set All Parameters', and 'Clear All Parameters'.

Figure 6. Selecting Departure Sequence Metering for the airport.

Step 2: Use the up and down arrows in the text box under the target queue 'New Value' column to enter a new target queue value, or click in the text box and manually type in a new target queue value. The selected New Value for target queue number will appear at the right side of the window, as seen in Figure 7, until the parameter has been Set.

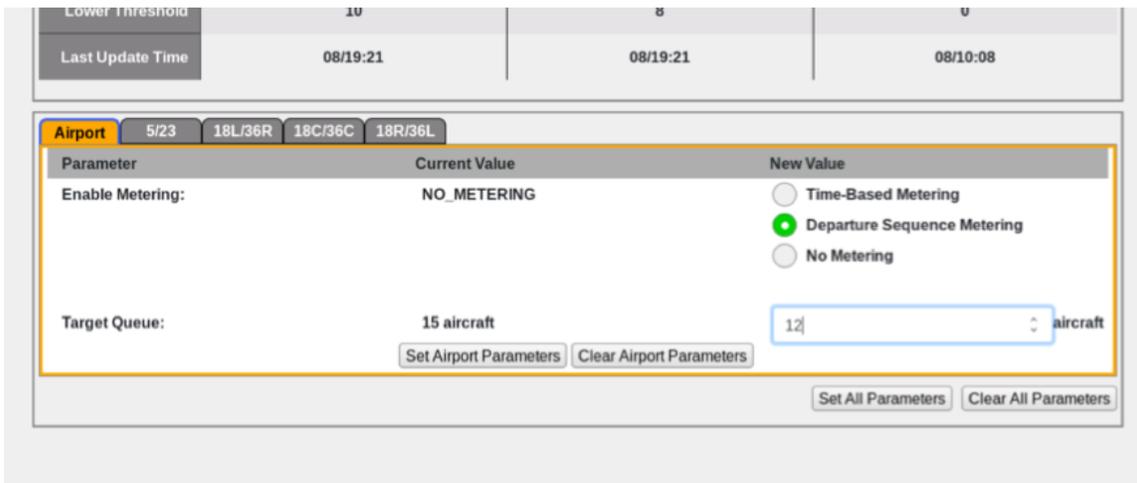


Figure 7. Select an integer value for the number of aircraft in the Target Queue.

Step 3a: Click on the 'Clear Airport Parameters' button to reject all changes in the 'Airport' tab only. Alternately, the 'Clear All Parameters' button (below the resource tabs) can be selected to reject all changes across all tabs. When the parameters are cleared, the entries and the orange box around the tab will disappear. **Note** that both 'Clear' button options will only revert changes that have not been Set; once the Set button is clicked, the clear button *will not* revert the entries to the previous settings.

Step 3b: Click on the 'Set Airport Parameters' button to accept all changes in the 'Airport' tab only. Alternately, the 'Set All Parameters' button (below the resource tabs) can be selected to accept all changes across all tabs. When 'Departure Sequence Metering' is Set, the 'Current Value' will change to display 'Departure Sequence Metering'.

2.1.2.1.3 No Metering

To turn off metering:

Step 1: Click on the 'No Metering' radio button under the 'New Value' heading. The radio button will turn grey when selected (see Figure 8) and an orange box will outline the 'Airport' tab, indicating that a potential change has been selected but has not yet been Set.

Target Threshold	12	10	0
Lower Threshold	10	8	0
Last Update Time	08/19:21	08/19:21	08/10:08

Airport	5/23	18L/36R	18C/36C	18R/36L
Parameter	Current Value	New Value		
Enable Metering:	NO_METERING	<input type="radio"/> Time-Based Metering <input type="radio"/> Departure Sequence Metering <input checked="" type="radio"/> No Metering		
<input type="button" value="Set Airport Parameters"/> <input type="button" value="Clear Airport Parameters"/>				
<input type="button" value="Set All Parameters"/> <input type="button" value="Clear All Parameters"/>				

Figure 8. Selecting No Metering for the airport.

Step 2a: Click on the ‘Clear Airport Parameters’ button to reject all changes in the ‘Airport’ tab only. Alternately, the ‘Clear All Parameters’ button (below the resource tabs) can be selected to reject all changes across all tabs. When the parameters are cleared, the entries and the orange box around the tab will disappear. **Note** that both ‘Clear’ button options will only revert changes that have not been Set; once the Set button is clicked, the clear button *will not* revert the entries to the previous settings.

Step 2b: Click on the ‘Set Airport Parameters’ button to accept all changes in the ‘Airport’ tab only. Alternately, the ‘Set All Parameters’ button (below the resource tabs) can be selected to accept all changes across all tabs. When the parameters are Set, the ‘Current Value’ will change to display ‘No Metering’ and the orange outline will disappear.

2.1.2.2 Runway Tabs

The ‘Runway’ tabs provide options for setting the ‘Upper Threshold’, the ‘Target Excess Queue Time’, and the ‘Lower Threshold’ for each individual runway (e.g., 5, 23, 18L, 36R). For each parameter, the ‘Current Value’ setting is shown, followed by up/down arrows under ‘New Value’ for selecting a different value.

The ‘Upper threshold’ is the largest acceptable amount of time that an aircraft could spend in the runway queue. The ‘TEQT’ is the desired amount of time for an aircraft to spend in the runway queue. The ‘Lower threshold’ is the least amount of time predicted in the runway queue for which Time-Based Metering is needed. When all aircraft have a predicted time in the runway queue below the lower threshold, the current metering program can end.

2.1.2.2.1 TEQT and Threshold Values

To set a parameter value for an individual runway from the ‘Runway’ tab:

Step 1: Use the up and down arrows in the text box under the ‘New Value’ column to enter a new upper or lower threshold or target excess queue time value, or click in the text box and manually type in a new value. The selected ‘New Value’ for upper or lower threshold or target excess queue time will appear at the right side of the window, as seen in Figure 9, until the parameter has been Set.

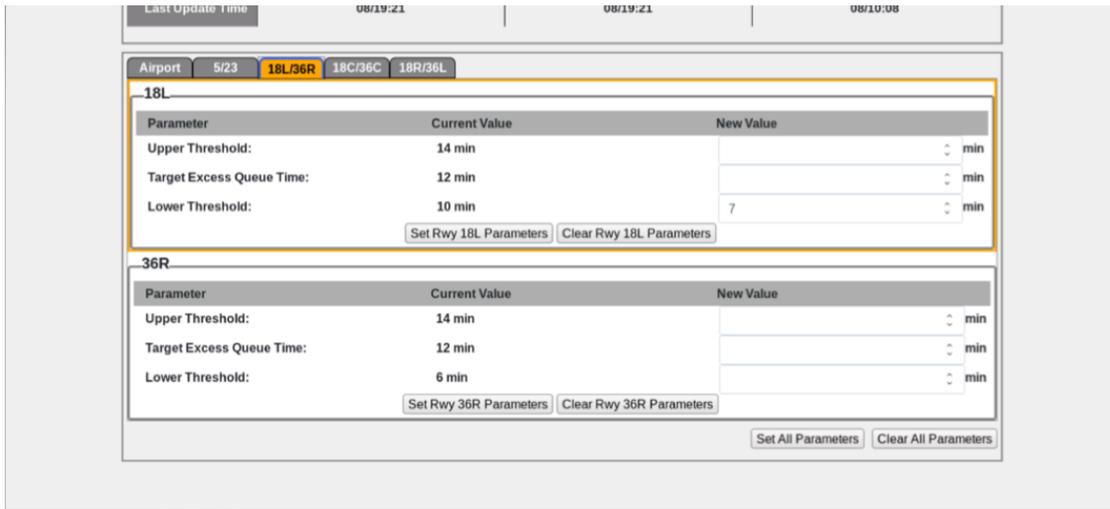


Figure 9. Setting TEQT and Threshold values for Runway 18L/36R.

Step 2a: Click on the ‘Clear <Runway> Parameters’ button to reject all changes in the specified ‘Runway’ tab only. Alternately, the ‘Clear All Parameters’ button (below the resource tabs) can be selected to reject all changes across all tabs. When the parameters are cleared, both the entries and the orange box around the tab will disappear, shown in Figure 10. **Note** that both ‘Clear’ button options will only revert changes that have not been Set; once the Set button is clicked, the clear button *will not* revert the entries to the previous settings.

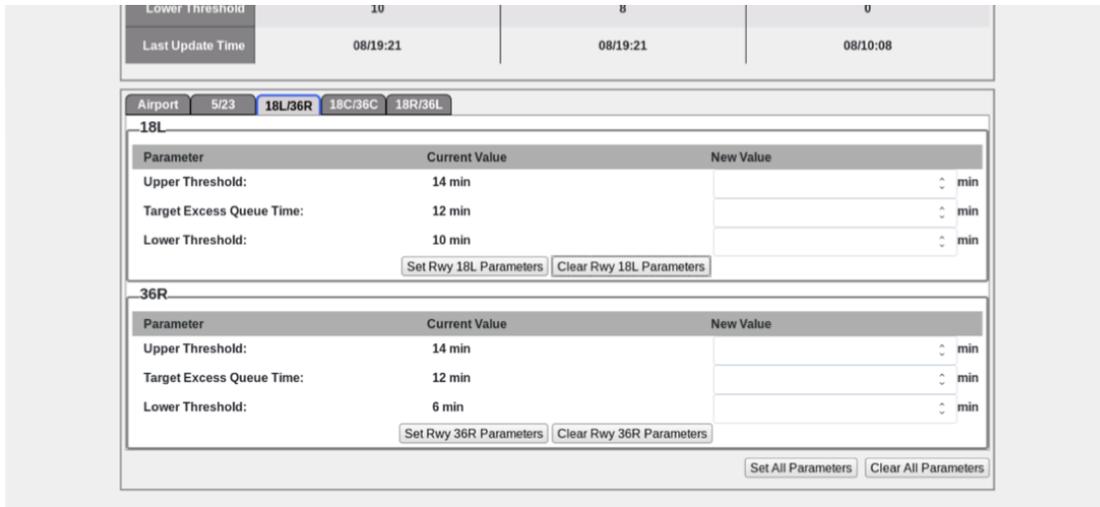


Figure 10. Clicking Clear Rwy 18L Parameters cleared any new selections under New Value and the orange outline (indicating changes) disappeared.

Step 2b: Click on the ‘Set <Runway> Parameters’ button to accept all changes in the ‘Runway’ tab only. Alternately, the ‘Set All Parameters’ button (below the resource tabs) can be selected to accept all changes across all tabs. An example of multiple tabs with changes specified is shown in Figure 11. When the ‘New Value’ is Set, the ‘Current Value’ will change to display the specified value.

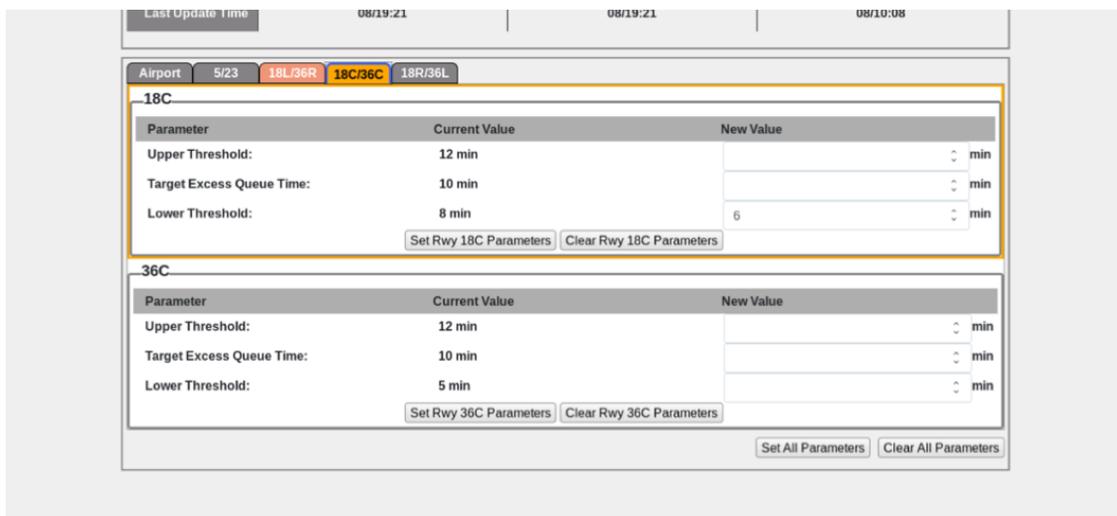


Figure 11. Multiple orange tabs show that changes have been selected for multiple runways.

Figure 12 shows the values after the multiple tabs have been Set.

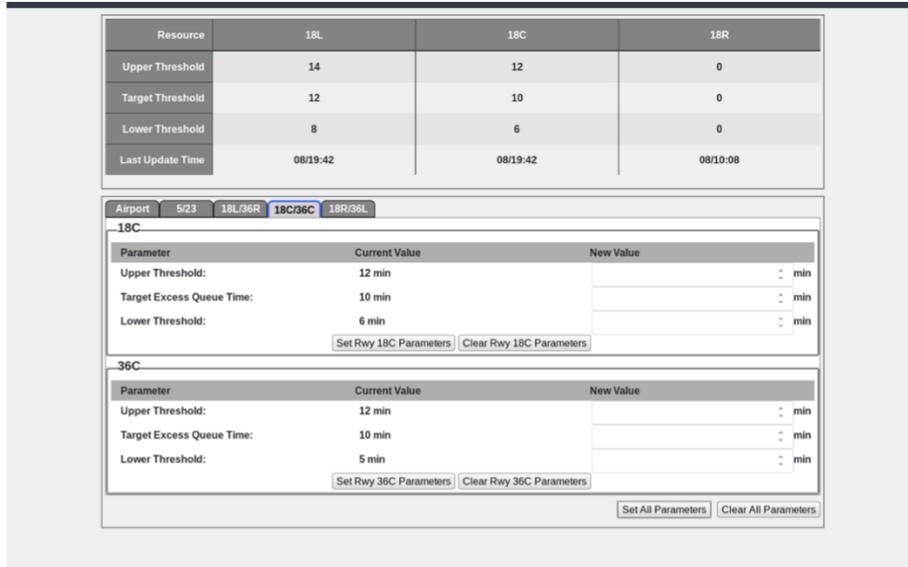


Figure 12. Parameter changes have been set for multiple runways.

2.2 Excess Queue Time

The primary information and selectable options for the Excess Queue Time page are shown in Figure 13. The top half of the page shows the current status of Surface Metering Programs (SMP). The lower half of the page shows scatter plots of actual and projected data by resource, either for the airport or for a specific runway, depending on which tab is selected. SMPs will appear in the top half of this page only if Time-Based Metering has been selected (see section 2.1.2.1.1) and the scheduler logic determines that metering will be needed within the time period specified.

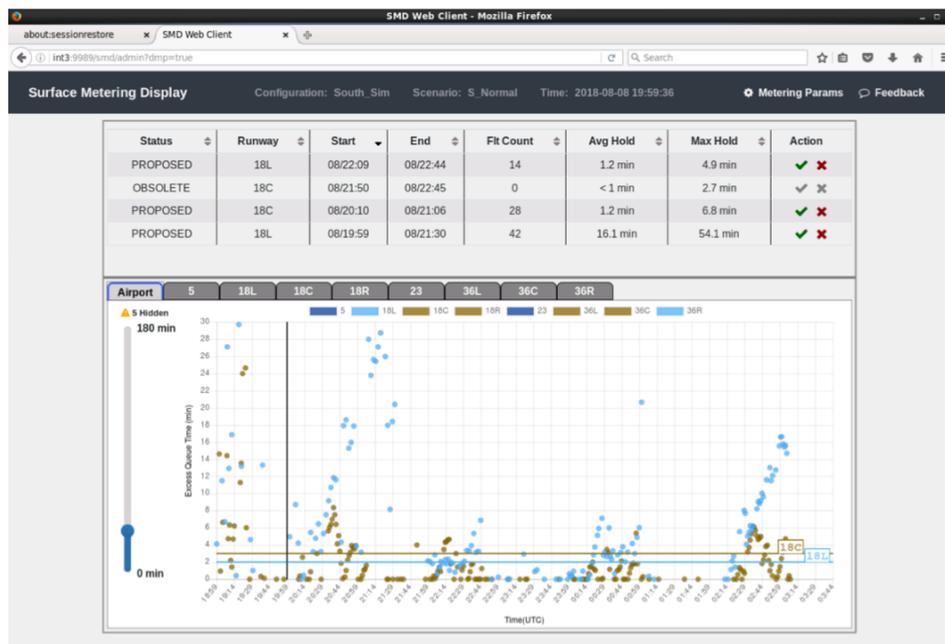


Figure 13. Excess Queue Time window with Airport scatter plot shown.

2.2.1 SMP Table

The top half of the Excess Queue Time page (see Figure 13) shows the current status for each SMP, including runway affected, start time, end time, flight count, average hold, and max hold, along with action buttons to make inputs.

The definitions for the data shown in the table are:

- Status – current metering status for the defined SMP (see section 2.2.1.1)
- Runway – the resource being metered
- Start – the specified start time of the SMP in DD/HH:MM format
- End – the specified end time of the SMP in DD/HH:MM format
- Flt Count – the number of flights affected by metering
- Avg Hold – the average hold time expected for all flights using that resource, in minutes
- Max Hold – the maximum hold expected for a flight using that resource within the metering time constraints, in minutes
- Action – Either a checkmark or an X. Actions are discussed further in sections 2.2.1.2.1 and 2.2.1.2.2.

2.2.1.1 SMP Status

The possibilities for current metering status are described in Table 1, with examples shown in the table in Figure 14.

Table 1. Possible states for SMP, shown under Status heading.

STATUS	DEFINITION
PROPOSED	The ATD-2 system is recommending that metering be used between the start and end time of the SMP, but no action has been taken on the SMP.
AFFIRMED	The recommended SMP has been accepted.
REJECTED	The recommended SMP was not accepted.
OBSOLETE	The ATD-2 system is no longer recommending metering. A PROPOSED, AFFIRMED, or REJECTED SMP can transition into this state.
ACTIVE	An affirmed SMP has started and RTC is now showing metering advisories for that runway.
COMPLETED	An active SMP is now finished.

In strategic metering, all of the states are possible. SMPs are created in response to identified needs and actions are enabled. States in the Status column will update quickly to reflect changes in status.

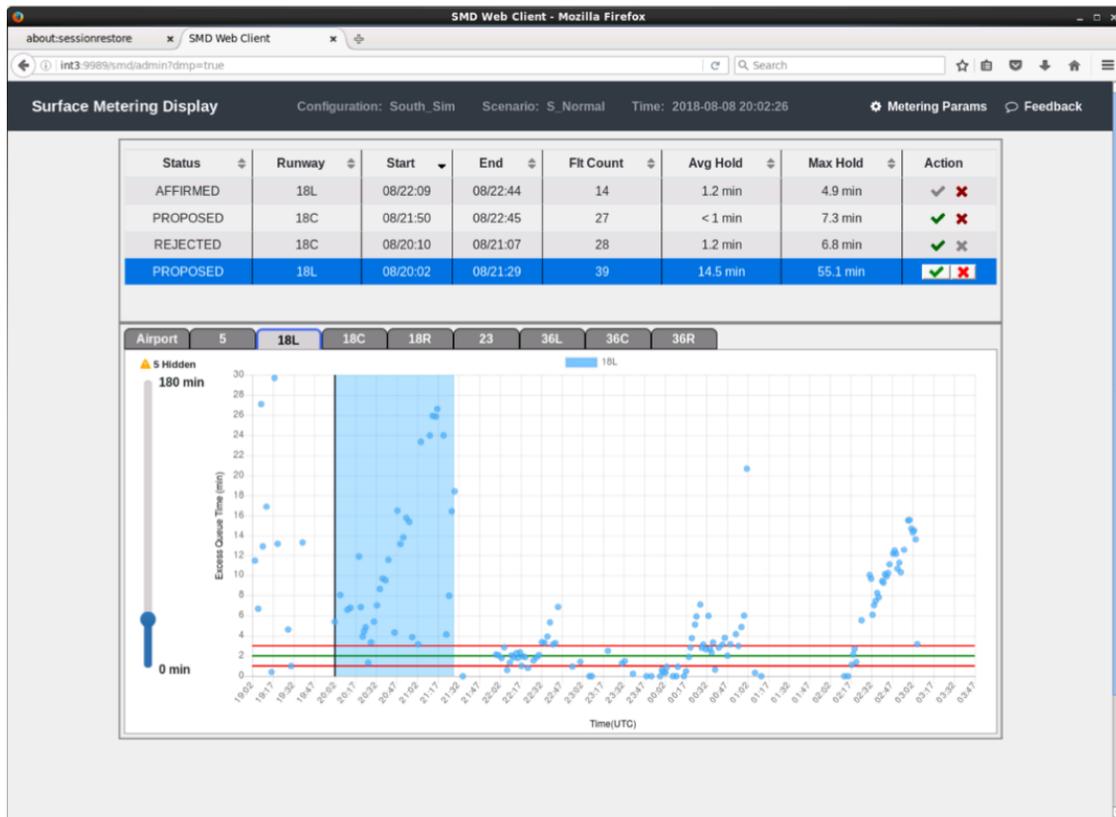


Figure 14. SMP table shows SMPs in various states.

The state of the SMP affects the start and end times reported, as follows:

- ‘Proposed’, ‘Affirmed’, or ‘Rejected’ SMP - The scheduler continually updates the predicted SMP start and end time, based on the latest data.
- ‘Active’ SMP - Only the end time is updated.
- ‘Completed’ SMP - Actual start and end time are known and do not change. The flight count and hold statistics reflect the actual values for the SMP.
- ‘Obsolete’ SMP – The start and end time are the last start and end time prior to the SMP becoming ‘Obsolete’.

An ‘Obsolete’ SMP will be removed once the end time expires, but SMPs can become ‘Obsolete’ even when their scheduled timeframe is still in the future. A ‘Completed’ SMP will be removed an hour after the end time.

2.2.1.2 Act on an SMP

To act on an SMP, the checkmark and/or X under ‘Action’ must be selectable. A selectable checkmark is shown in green; a selectable X is shown in red. Examples are shown in Figure 15.

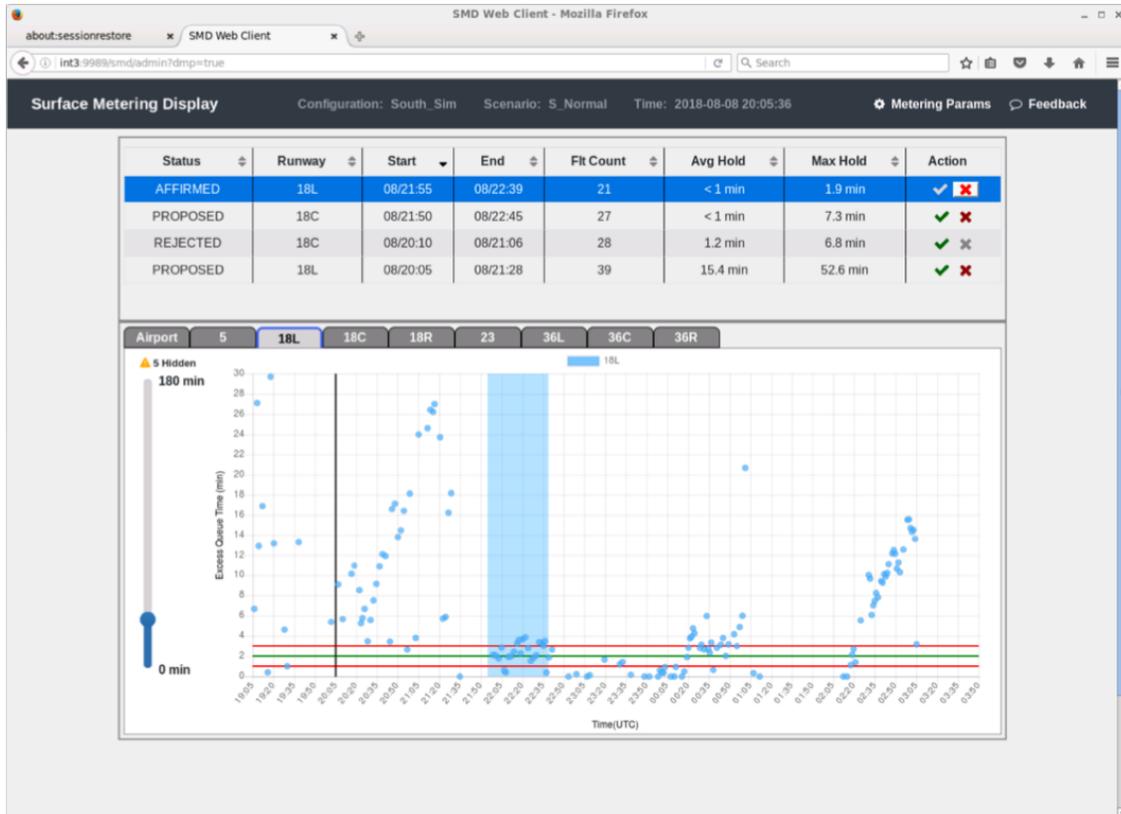


Figure 15. Action items are selectable if shown in red or green in the SMP table.

For either the checkmark or X to be selectable, the SMP must be in a state for which that button is active:

- Checkmark – Affirms the selected SMP, if the current state is ‘Proposed’ or ‘Rejected’.
- X – Rejects the selected SMP, if the current state is ‘Proposed’, ‘Affirmed’, or ‘Active’.

The checkmark and X under ‘Action’ are not active/selectable once an SMP is ‘Completed’ or ‘Obsolete’ (example shown in Figure 16).

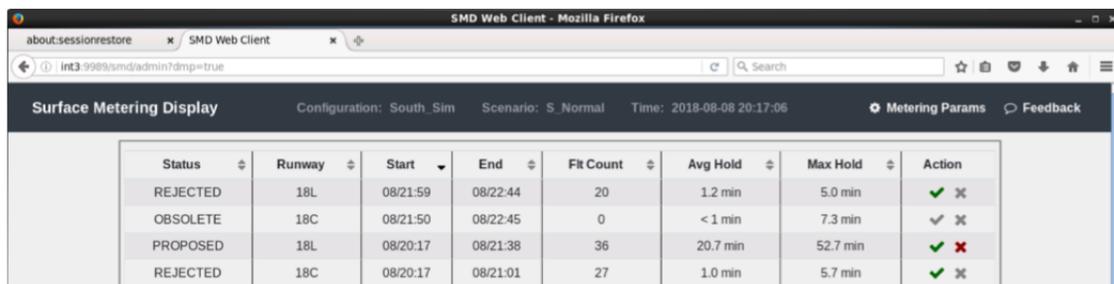


Figure 16. An Obsolete SMP has no selectable actions.

2.2.1.2.1 Affirm

To affirm an SMP:

Step 1: Click on an SMP row in the SMP table to highlight that row and the specified SMP timeframe on the data plot.

Step 2: Once a row is highlighted, the 'Action' column will display a selectable green checkmark if the current status is 'Proposed' or 'Rejected'. For any other status, the checkmark will remain gray and will not be selectable.

Step 3: Click on the green checkmark to affirm the SMP.

Step 4: A highlighted message appears at the bottom of the window stating that the SMP was affirmed, as shown in Figure 17.

Step 5: The status in the SMP table will change to 'Affirmed'.

Step 6: Click that SMP again or click on another chart tab to deselect the row and clear the highlighting.



Figure 17. Clicking Checkmark under Action caused acknowledgement message to appear at bottom of window.

2.2.1.2.2 Reject

To reject an SMP:

Step 1: Click on an SMP row in the SMP table to highlight that row and the specified SMP timeframe on the data plot.

Step 2: Once a row is highlighted, the 'Action' column will display a selectable red X if the current status is 'Proposed', 'Affirmed', or 'Active'. For any other status, the X will remain gray and will not be selectable.

Step 3: Click on the red X to reject the SMP.

Step 4: A highlighted message appears at the bottom of the window stating that the SMP was rejected, as shown in Figure 18.

Step 5: The status in the SMP table will change to 'Rejected'.

Step 6: Click that SMP again or click on another chart tab to deselect the row and clear the highlighting.

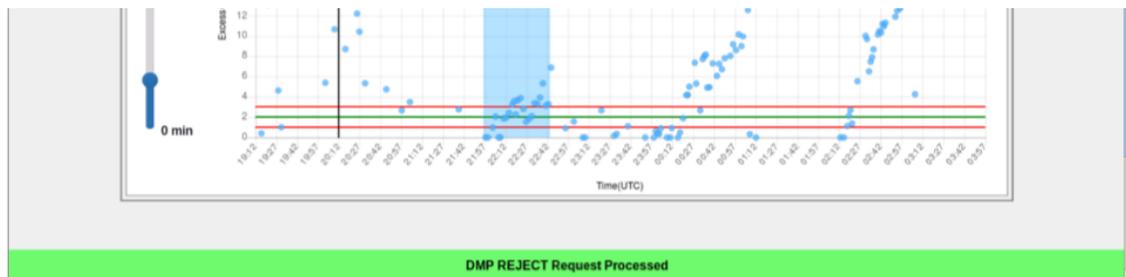


Figure 18. Clicking X under Action caused acknowledgement message to appear at bottom of window.

2.2.2 Resource Tabs

The bottom half of the Excess Queue Time page shows resource tabs that allow data to be seen for the entire airport or for individual runways. These tabs can be seen in Figure 13 directly below the SMP table. This section describes the options and functionality available for each resource tab.

2.2.2.1 Airport Tab

The 'Airport' tab shows scatter plot data for the entire airport, seen in Figure 13. This data is plotted by Excess Queue Time (in minutes) vs. Takeoff Time (in UTC). Each data point is a departure flight, color-coded by runway and only shown for the active runways.

All data points to the left of the vertical black line show actual data for departure flights that have departed. All data points to the right show predicted data for departures that have not yet departed. Each data point is plotted along the x-axis at either the actual or predicted takeoff time of the flight. The height of the data point represents either the actual or predicted time in queue (i.e., the actual or predicted amount of time taxiing beyond unimpeded taxi time). These plots include only flights not constrained by an APREQ, fix closure, or ground stop. The lines on the airport scatter plot show the Target Threshold for each active runway, color-coded by runway.

Hovering over a data point will reveal a data tag with information about the flight. To see specific flight information for a data point from the 'Airport' tab:

Step 1: Hover over a data point.

Step 2: A data tag will temporarily appear with information about that flight.

The time slider to the left of the plot can be set from 0 to 180 min. This slider sets the maximum time shown on the vertical axis of the plot. The yellow triangle with '# Hidden' that displays above the slider indicates the number of flights that are not showing because they are outside of the range set by the slider.

To change the maximum time shown on the data plot from the 'Airport' tab:

Step 1: Click on the circle of the slider and move the ball up or down to modify the maximum time shown on the scatter plot.

Step 2: The scatter plot will update to reflect the new maximum time selected (see Figure 19).

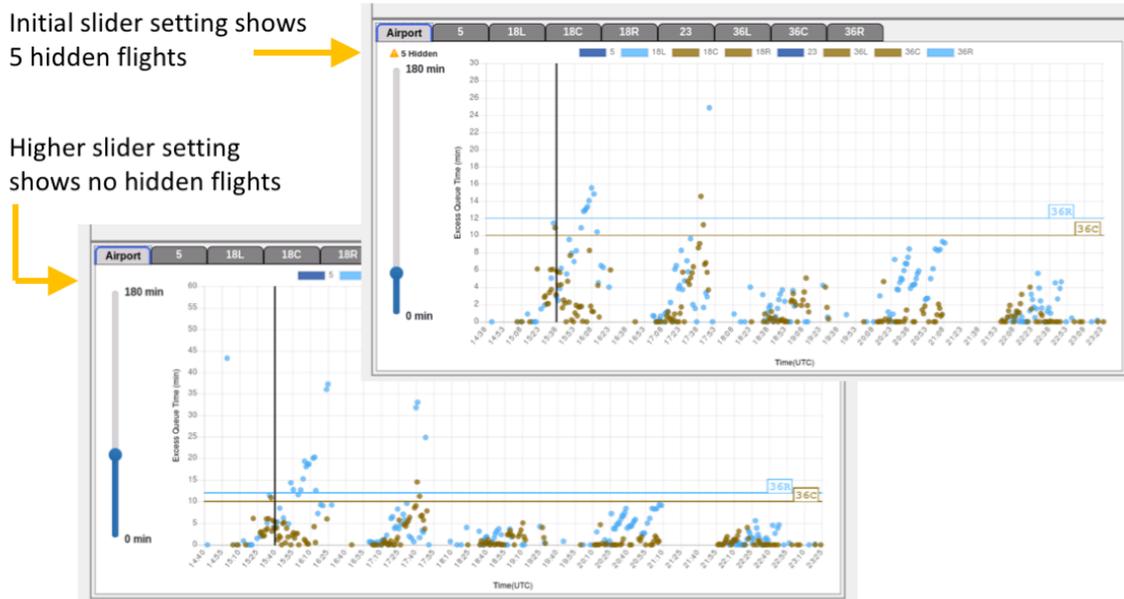


Figure 19. Slider changes maximum y-axis value shown on airport scatter plot.

2.2.2.2 Runway Tabs

The ‘Runway’ tabs show scatter plot data for an individual runway (see an example in Figure 14). This data is plotted by Excess Queue Time (in minutes) vs. Takeoff Time (in UTC). Each data point is a departure flight, which is color-coded to that runway. Data points are only shown if the runway is active.

All data points to the left of the vertical black line show actual data for departure flights that have departed. All data points to the right show predicted data for departures that have not yet departed. Each data point is plotted along the x-axis at either the actual or predicted takeoff time of the flight. The height of the data point represents either the actual or predicted time in queue (i.e., the actual or predicted amount of time taxiing beyond unimpeded taxi time). These plots include only flights not constrained by an APREQ, fix closure, or ground stop. The green line on each scatter plot shows the Target Threshold value for that runway; the red lines show the Upper and Lower Threshold values.

Hovering over a data point will reveal a data tag with information about the flight. To see specific flight information for a data point from a ‘Runway’ tab:

Step 1: Hover over a data point.

Step 2: A data tag will temporarily appear with information about that flight.

The time slider to the left of the plot can be set from 0 to 180 min. This slider sets the maximum time shown on the vertical axis of the plot. The yellow triangle with ‘# Hidden’ that displays above the slider indicates the number of flights that are not showing because they are outside of the range set by the slider.

To change the maximum time shown on the data plot in a ‘Runway’ tab:

Step 1: Click on the circle of the slider and move the ball up or down to modify the maximum time shown on the scatter plot.

Step 2: The scatter plot will update to reflect the new maximum time selected (see Figure 20).



Figure 20. Slider changes maximum y-axis value shown on runway scatter plot.

2.3 Feedback

Selecting the ‘Feedback’ button in the upper right corner of the SMD window (see Figure 21) brings up the Feedback Form page (see Figure 22).

To submit feedback on the ATD-2 system:

Step 1: Select the ‘Feedback’ button in upper toolbar of the SMD window (Figure 21).



Figure 21. The ‘Feedback’ button is in the upper toolbar of the SMD window.

Step 2: The Feedback Form page will appear in the SMD window (Figure 22).

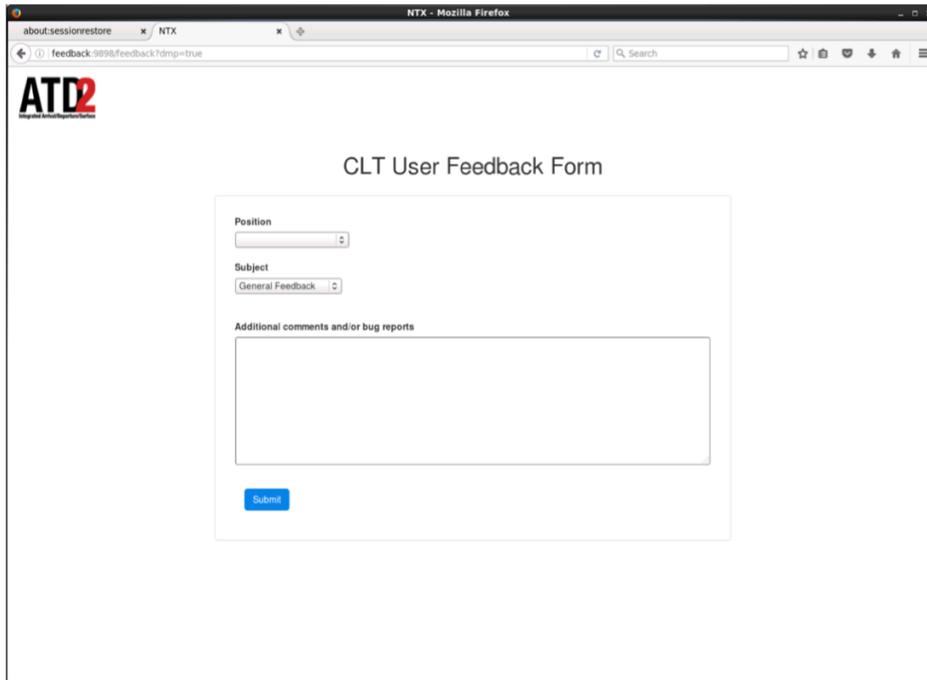


Figure 22. Feedback form page.

Step 3: Under ‘Position’ in the Feedback Form page, select the up/down arrows to bring up a list of job positions.

Step 4: Select the appropriate position in the drop-down list (see Figure 23).

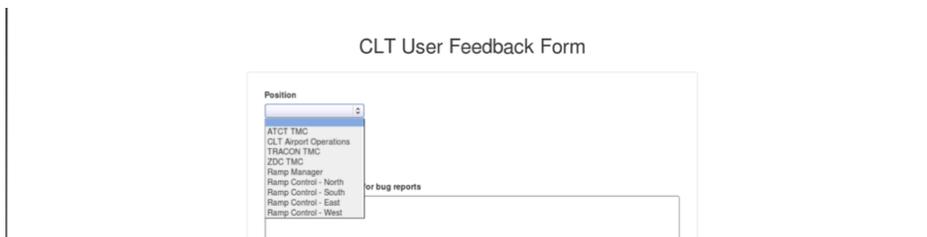


Figure 23. Position drop-down list.

Step 5: Under ‘Subject’ in the Feedback Form page, select the up/down arrows to specify the general subject of the feedback being submitted (see Figure 24).

CLT User Feedback Form

Position
ATCT TMC

Subject
General Feedback
Unexpected Behavior
Incorrect TML Data
Gate Conflict Issue
Flight Matching Issue
Other...

Additional comments and/or bug reports

Figure 24. Subject drop-down list.

Step 6: Under ‘Subject’ in the Feedback Form page, if ‘Other ...’ is chosen, an additional line will appear under Other that says ‘Enter subject:’. Type in the subject of the feedback in the box on that line (see Figure 25).

CLT User Feedback Form

Position
ATCT TMC

Subject
Other...

Enter subject:

Additional comments and/or bug reports

Figure 25. ‘Other...’ type in box.

Step 7: Enter additional comments in the larger box in the bottom half of the Feedback Form page (see Figure 26). Be as detailed or brief as you need to be. If you are reporting a bug, please indicate the day, time, and specific flight numbers, if possible, so the issue can be investigated from the data archives.

CLT User Feedback Form

Position
ATCT TMC

Subject
Unexpected Behavior

Additional comments and/or bug reports
Enter your comments and/or bug reports here.

Submit

Figure 26. Additional comments can be entered after selecting Position and Subject.

Step 8: Once the Position and Subject are selected and all additional comments/information are entered, click ‘Submit’ in the Feedback Form page (see Figure 26). The information will be transmitted to the ATD-2 team for review and action.

Thank you for taking the time to provide system feedback.

3 Check Metering State

ATD-2 strives to make consistent information available to every user interface. Both the STBO Client and the RTC/RMTC contain icons that show the current state of metering being used by the system. Changes in the metering state are immediately reflected on all systems.

3.1 STBO Client

The Metering Mode icons are located at the right side of the Operational STBO Client Toolbar window. Table 2 provides a quick reference guide for the metering icons.

The Time-Based Metering icons appear when ‘Time-Based Metering’ is enabled on the SMD. A Time-Based Metering icon is depicted as a circular meter within a black square, with a runway name in the center of the meter and a background color of either white or cyan. There is a Time-Based Metering icon shown for each active departure runway.

The SMD Status is shown as a gear icon. It is shown in black, but it turns orange when a new SMP is proposed.

Table 2. Legend for Metering icons.

Main Color	Metering?	Symbology	Icon Graphic
White	Time-Based Metering	Color - No Active SMP on runway	
Cyan	Time-Based Metering	Color - Current Active SMP on runway	
Black	SMD Status	Color – No proposed SMP	
Orange	SMD Status	Color – A newly proposed SMP is available	
Green	Departure Sequence Metering	Number - Target number of aircraft for departure sequencing	
Gray	No Metering	Red slash – No metering	

The Departure Sequence Metering icons appear when ‘Departure Sequence Metering’ is enabled on the SMD. A Departure Sequence Metering icon is depicted as a green circular meter within a black square, with a number indicating the number of target aircraft for departure sequencing. Queue size for Departure Sequence Metering can only be set for the entire airport, so the number in the center of the icon will be the same for all active departure runways. Departure Sequence Metering icons are shown for each active departure runway.

The No Metering icon appears when ‘No Metering’ is selected on the SMD. The No Metering icon is depicted by a gray circular meter on a black square, with a red circle and slash over the gray meter.

3.2 RTC/RMTC

The Metering mode icons are located near the upper right corner of the Ramp Traffic Console window, for both Ramp controllers and the Ramp Manager.

The icons used on the Ramp Traffic Console are identical to those used on the STBO Client.

Appendix A: SMD Metering

Note: This section is for developers and testers only.

SMD ran in Tactical mode prior to v4.0.0 of the ATD-2 software. With the release of v4.0.0, the SMD will be running in Strategic mode.

The switch to change from one mode to the other is located in the file:

```
$INSTALL_LOCATION/runtime/tactical/config/tactical/scheduler.properties
```

Set the parameter:

```
tactical.scheduler.dmp.service.type=STRATEGIC
```

(previously, TACTICAL)

After this change is saved, access the SMD display in the web server via the following URLs.

Tactical URLs:

<http://localhost:9989/smd/admin>

<http://localhost:9989/params/admin>

Strategic URLs:

When running in the Strategic setting, both URLs are appended with 'dmp=true' to indicate that the SMP table should show on the Excess Queue Time page.

<http://localhost:9989/smd/admin?dmp=true>

<http://localhost:9989/params/admin?dmp=true>

For read-only access to the SMD displays, leave the 'admin' parameter off the URL.

A.1 Tactical Metering Nuances

Metering States:

- Only the 'Active' and 'Completed' states existed. An SMP showed ACTIVE when it was so, and it changed to COMPLETED at the time when the scheduler determined that the SMP should end.
- No 'Proposed' SMPs were created that could be accepted or rejected. Thus, the action buttons were not truly active.

End time:

- SMPs were created with no end time until the metering logic determined that the SMP was no longer needed, then the end time was updated to be the current time.

A.2 Strategic Metering Nuances

Metering States:

- All of the states are possible.
- Advance SMPs are created and actions are enabled.
- States in the Status column update quickly to reflect changes in status.

Start and end times:

- ‘Proposed’, ‘Affirmed’, or ‘Rejected’ - The scheduler continually updates the predicted SMP start and end times based on the latest data.
- ‘Active’ - Only the end time is updated.
- ‘Completed’ - Actual start and end times are known and do not change. The flight count and hold statistics reflect the actual values for the SMP.

Appendix B: Acronyms

This appendix defines acronyms and terms that are used repeatedly throughout ATD-2 and this SMD User Manual.

Acronym	Term
!=	Does not equal or not equal to
AAL	American Airlines
AC	Aircraft
ACID	Aircraft Identifier
ACK	Acknowledge
ADW	Arrival / Departure Window
AFP	Airspace Flow Program
AIBT	Actual In Block Time
ALDT	Actual Landing Time
AMA	Airport Movement Area
AMAT	Actual Movement Area entry Time
AOBT	Actual Off Block Time
APREQ / CFR	Approval Request / Call For Release
ARR / DEP	Arrival / Departure
ARRFIX	Arrival Fix
ARTCC	Air Route Traffic Control Center
ASDE-X	Airport Surface Detection Equipment - Model X
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
ATD-2	Airspace Technology Demonstration 2
ATOT	Actual TakeOff Time
BOS	Boston Logan International Airport
CC	Configuration Change (Runway)
CDM	Collaborative Decision Making
CDR	Coded Departure Route
CLT	Charlotte Douglas International Airport
CSV	Comma-Separated Values (file type)

Acronym	Term
CTOP	Collaborative Trajectory Options Program
CTOT	Controlled TakeOff Time
DAL	Delta Air Lines
DB	DataBlock
DEPFI	Departure Fix
DEST	Destination
DFW	Dallas / Fort Worth International Airport
DMP	Departure Metering Programs (synonymous to SMP)
EDCT	Expected Departure Clearance Time
EFTT	Earliest Feasible Takeoff Time
EOBT	Earliest Off-Block Time
ESTIBT	Estimated In-Block Time
ESTOBT	Estimated Off-Block Time
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
FAA	Federal Aviation Administration
FDX	FedEx
FUSION	Consolidates all available airport surveillance to simulate a single-sensor radar display system
GDP	Ground Delay Program
GS	Ground Stop
HSV; HSL; RGB; CMYK	COLOR MODELS: Hue, Saturation, Value; Hue, Saturation, Lightness; Red, Green, Blue; Cyan, Magenta, Yellow, Key (Black)
ICAO	International Civil Aviation Organization
ID	Identification
IDAC	Integrated Departure Arrival Capability
IOBT	Initial Off-Block Time
LGA	LaGuardia International Airport
LIBT	Airline In Block Time

Acronym	Term
LOB	Long On Board
LOBT	Airline Off Block Time
MIT	Miles-In-Trail
NASA	The National Aeronautics and Space Administration
<i>nmi</i>	Nautical miles
OIS	FAA Operational Information System
OPNEC	Operational Necessity
REQ	Request
RMTC	Ramp Manager Traffic Console
RTC	Ramp Traffic Console
RWY	Runway
SDT	Scheduled Departure Time
SIBT	Scheduled In Block Time
SID	Standard Instrument Departure
SLDT	Scheduled Landing Time
SMA	Surface Movement Advisor
SMD	Surface Metering Display
SMP	Surface Metering Programs
SOBT	Scheduled Off-Block Time
STA	Scheduled Time of Arrival
STAR	Standard Terminal Arrival Route
STARS	Standard Automation Replacement System
STBM	Surface Time-Based Metering
STBO	Surface Trajectory Based Operations
STOT	Scheduled Take Off Time
SWIM	System-Wide Information Management
TBD	To Be Determined
TBFM	Time-Based Flow Management System
TEQT	Target Excess Queue Time
TFDM	Terminal Flight Data Manager

Acronym	Term
TFM	Traffic Flow Management
TFMS	Traffic Flow Management System
TIBT	Target In Block Time
TLDT	Target Landing Time
TM	Traffic Management
TMA	Traffic Management Advisor
TMAT	Target Movement Area entry Time
TMI	Traffic Management Initiative(s)
TOBT	Target Off-Block Time
TRACON	Terminal RADAR Approach Control
TTOT	Target Take Off Time
TZ	Track data from TFMS
UAL	United Airlines
UIBT	Undelayed In Block Time
ULDT	Undelayed Landing Time
UMAT	Undelayed Movement Area entry Time
UNK	Unknown
UOBT	Undelayed Off-Block Time
UTOT	Undelayed Take Off Time