Merkato™

Seller's User Guide
Merkato Version 2.3

October 2002

Contents

Deciding How Much to Sell and How to Sell It

Merkato lets you decide how much bandwidth you are releasing for sale and how you want to price it. It also lets you determine the type of market you want to sell it in. Merkato is configured partially by you, on the Merkato interface, and partly by an administrator, using your specifications.

To determine how to make Merkato work for you, answer the following questions:

1. **How will buyer traffic be identified?** Merkato must be able to distinguish between data belonging to each buyer so that bandwidth can be apportioned correctly. The most common identifier is an IP subnet—identified by an IP address and subnet mask. Traffic can also be identified by the physical port or logical interface to which a buyer is connected, VLAN tags on the buyers' data streams, or the MAC address of the next-hop router from which a buyer's traffic flows. (All buyers within the same marketplace should use a common method for identification of their traffic to avoid unnecessary complexity.)

2. **In what direction will bandwidth be apportioned?** Although buyer traffic nearly always flows both in and out of any interface, it is often unnecessary to apportion bandwidth in both directions. Generally, there is an obvious direction that corresponds to the application being addressed. For example, if you use Merkato to apportion bandwidth among content providers, the direction to control would be from the source of content to the receivers of that content. If there is no obvious direction, Merkato can apportion bandwidth in both directions simultaneously. It is also possible to use Merkato to create separate markets for incoming and outgoing traffic. (If you grant bandwidth in one direction be careful that you allow sufficient bandwidth for protocol acknowledgements in the other direction.)

3. **How strictly do you want to limit bandwidth?** The most common method of enforcing bandwidth limits is the least forgiving—discarding any traffic that exceeds the amount of bandwidth purchased. In some cases, however, you may want to allow excess traffic to be sent if there is enough unused capacity. We only recommend allowing this permissive behavior in unique applications.

4. **Do you want to sell spot-market bandwidth, reserved bandwidth, or both?** Spot markets allow purchase of bandwidth on-demand, at a price and quantity determined by Merkato's auction mechanism. You set the maximum capacity and the minimum price floor before auctioning occurs.

   Reservation markets allow buyers to reserve a certain amount of bandwidth for a specific length of time, at a pre-determined price you determine. You set the capacity of bandwidth available for reservations. You can set pricing based on the amount of bandwidth the buyer requests and on the length of time for which the buyer requests it. You also specify a cancellation fee.

5. **How often would you like spot market auctions to run?** By default, spot market auctions run as often as possible—every five minutes or less. We recommend running auctions as often as possible to provide buyers with the fastest possible response to their changes. If you would like to run auctions less often—perhaps you would like them to occur at nearly fixed intervals—your Merkato administrator can increase the pause time between auctions. By default, the pause time is just long enough to allow allocations to be configured in the network before the next auction starts, but this can be increased to lengthen the time between auctions. Although the time between auctions is lengthened, the auctions themselves still occur within the same short interval between pauses.

6. **Do you want buyers to access spot and Reservation markets through a single agent or through separate agents?** Normally, buyers use a single username and password to access both the spot and reservation agents. The buyer selects the agent to download from either the spot garage or the reservation garage. Alternatively, both agents can be kept in the same garage, but must be accessed via different usernames.

7. **How much bandwidth do you want to release to the market?** The price of bandwidth sold in the Merkato system varies according to the level of demand. You can stimulate demand by reducing amount of bandwidth you make available. Of course, you sell less total bandwidth as well. At the other extreme, if available bandwidth always exceeds demand, the market price remains at your floor price (which may be desirable). You can specify the amount of bandwidth to be sold on the Spot market and on the Reservation market separately. In the Spot market, you can adjust the capacity at any time via an Agent interface.

8. **Do you want to create buy-back agents to automatically control the supply of bandwidth?** You can create and configure agents as though you were a buyer. The behavior of these agents has the effect of releasing bandwidth to the marketplace at certain price points. These artificial buyers bid at certain price points and quantity levels and "win" the bandwidth until they are outbid by true buyers.

Your answers to questions 1-6 determine how your administrator configures Merkato. (See *Seller's Reference Manual*, "Seller Type-of-Service Options.")

The amount of bandwidth you release for sale (question 7) is something you configure with the administrator. Your Merkato Seller agent lets you specify the amount of bandwidth for sale on the spot market. The administrator changes the capacity of the Reservation market.

Creating buy-back agents (question 8) requires you to operate as a buyer in the Merkato market you create.

The Seller Agent

Your first point of entry to the Merkato System is through the Portal, a web-based application that provides accounting and status information, as well as access to the Merkato agents. Your version of the portal may be slightly different than that the one shown in Figure 1, but the functionality is the same.

Note: Merkato has been tested on Internet Explorer version 6.0 and later versions. While Merkato may work on other browsers, we have not verified this.

Enter a valid user name and password and click **Login**.

The Merkato Portal appears, shown in Figure 2.

From this screen you can get to the various screens that make up the portal, and to the Desktop interface.
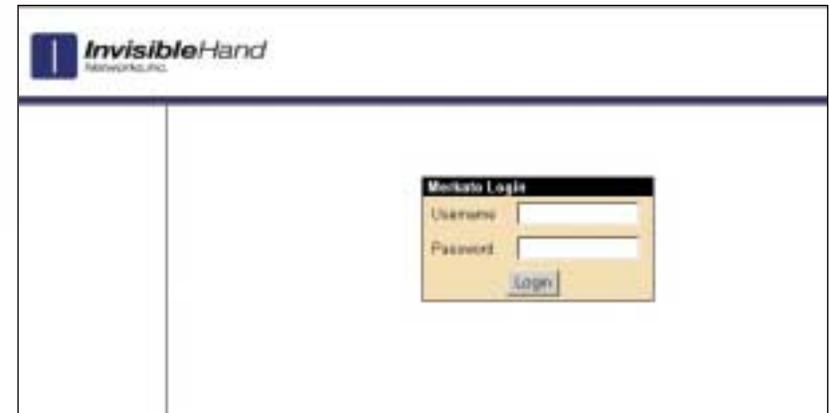
Figure 1: The Merkato Login Screen
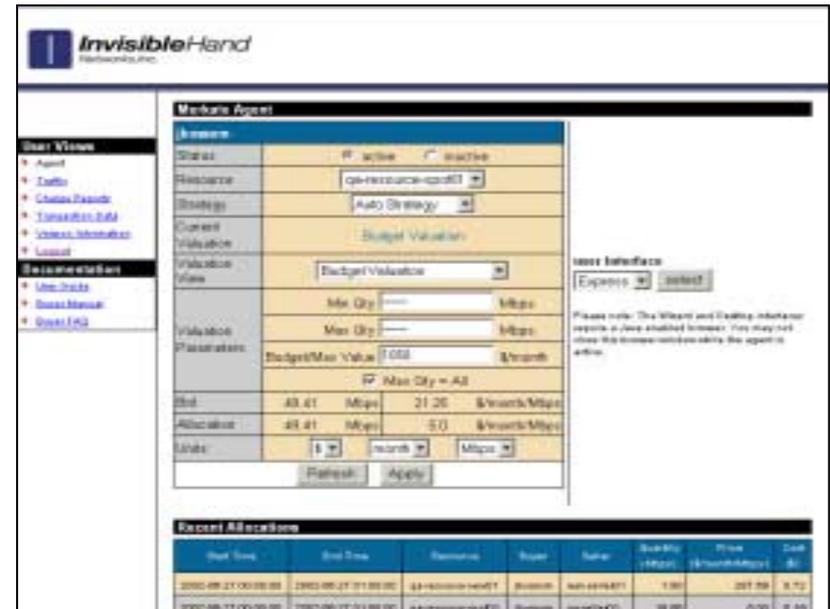
Figure 2: The Opening Merkato Portal Screen

Choice of Interface

You can choose from an interface to set preferences and get information. The User Interface menu gives you three choices.

- The **Desktop** interface allows you to sell bandwidth and monitor activity through a series of user-selectable windows. Your agent is brought to your PC and bids on your behalf from there.

- The **Express** interface lets you obtain status information from, and send configuration information to, an agent in the garage. The Express interface is displayed on the Portal page upon successful login. The fields on the Express interface are less interactive than the Java-based Merkato Desktop interface.

(The **Wizard** does not currently support seller configuration. Selecting Wizard results in an error message.)

When you are not interacting with your desktop agent you should send it to the garage. This is critical for Seller agents on the desktop because if the Seller agent ceases to bid from the desktop the auction stops.

Note: Selling From the Garage or From the Desktop

Although the auction allocation process runs continuously, there is no need for you to be directly involved at all times. Your agent can work automatically when you configure its quantity and value fields. Your agent communicates with the seller's agent on a Merkato platform called the Garage. (The Garage is Merkato's name for auction services it runs from a remote server.)

Once you configure your agent, you can change valuations from your PC using a Java-based application, or communicate remotely with your agent as it bids from the Garage.

Running the agent on your PC desktop and operating a remote agent each has advantages. On your PC, the Merkato desktop display gives you real-time information about the auction and its participants. If you are not interacting with the agent, you can configure it and upload it to the garage. It will continue to run, and you avoid the chance of halting the auction if your PC crashes or you have network connectivity problems.

Using the Desktop Interface

The Desktop interface allows you to control the selling agent and observe the auction in progress. Your agent is brought to your PC and bids on your behalf from the Merkato desktop.

Java on Your Browser

If your browser is not configured for Java version 1.4.1 you must download it before you can run a Desktop agent. You can allow Merkato to do this automatically, or you can download it directly from the source whose link is provided in the login page.

There are later versions of Java, but we do not recommend using them.

Automatic Download

If your browser doesn't have Java version 1.4.1, the first time you attempt to download a Desktop agent you are guided through the installation of the Java plug-in.

Reply "Yes" to all security permission requests.

Active Download

If you encounter problems, you can download Java free from Sun Microsystems. The URL is:

```
http://java.sun.com/j2se/1.4/download.html
```

Note: Currently, to get the plug-in, you must download the entire Java Run Time Environment, which is greater than 5 MB. Netscape version 6.1 for Windows appears to support the Merkato Java applications, but it is not fully tested for Merkato version 2.3.

Downloading the Desktop Agent

To open the Desktop agent, do the following:

1. From the Merkato portal, select Desktop from the user interface menu and click **select**.

The Desktop window appears, as shown in Figure 3.

2. From the File pull-down menu, select Download Agent. The Agent Download login box appears (Figure 4).

3. By default, the user name and password you used to enter the Merkato portal populates the Agent Download login box. Change this if necessary to make sure you download the correct agent.

4. Select a garage from the pull-down menu. Make sure the garage you select is the one you want to bid in.

> **Note:** Do not close the Portal browser window when the Merkato Desktop is open. You may browse to other web pages, but you must leave the browser window open for the Merkato Desktop to continue operating properly.

When the agent finishes downloading it appears on the Merkato desktop, as shown in Figure 5.
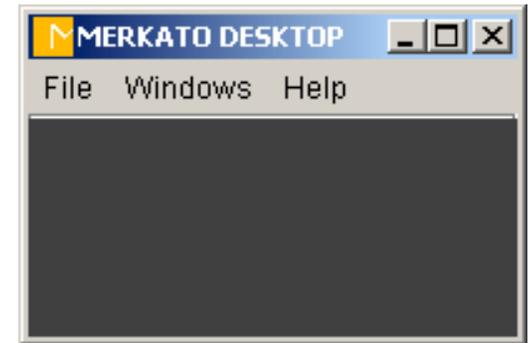
Figure 3: The Merkato Desktop
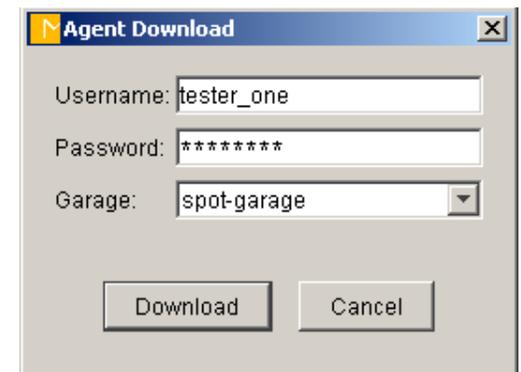
Figure 4: The Desktop Agent Download Window
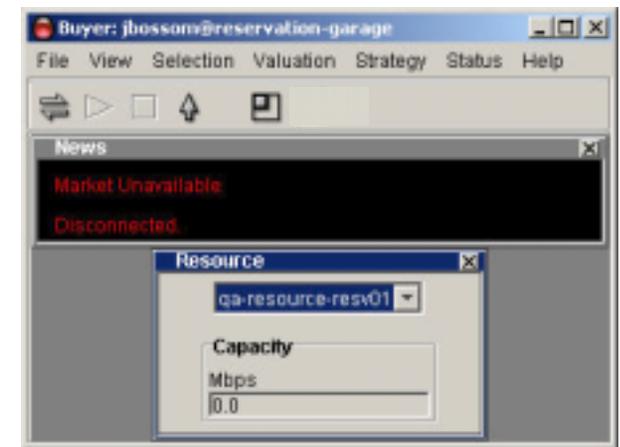
Figure 5: The Desktop Agent Window

Using the Express Interface

The Express interface is an HTML version of the Desktop interface, with some significant differences:

- It leaves your agent in the garage (the remote Merkato server) and controls it remotely. Closing the browser window makes no difference to your agent in the garage.

- Your screen is not updated in real time. You must click **Refresh** to update information in status displays.

- Reservations and certain spot market settings are not supported in this interface (significant for Buyer agents, but not for Seller agents)

The Express interface is meant to support advanced users who know what the fields mean and want a quick way to check agent status or make configuration changes.

The Express agent is in the initial portal browser window when you open it. If your agent was active and bidding from the garage you see a window like the one in Figure 6.

Use the two buttons at the bottom of the window to communicate with your Seller agent.

- Click **Refresh** to update the read-only status fields in the windows without sending configuration changes to the Resource agent.

- Click **Apply** to send configuration changes to the Resource agent.

To exit the Express window without sending configuration changes to the Resource agent click **Logout**.

For a complete description of the fields in the Express Agent interface, see *Seller's Reference Manual*, "Express Agent View."

Figure 6: The Express Agent Interface

Selling on the Spot Market

Setting the Valuation

The seller valuation sets the quantity of bandwidth available in the marketplace and the absolute minimum price at which it will be sold. In an auction, your agent uses this valuation information to determine what quantity is being sold and the floor price.

1. From the Valuation pull-down menu, select Seller Valuation. The Seller Valuation window appears (Figure 7).

2. Select the **Current Valuation** radio button label at the top of the panel.

3. Configure the Quantity and Value parameters.

   - "Qty" sets the current quantity for sale in the marketplace. Your agent sells all this bandwidth to the buyers unless the cumulative bandwidth requested by buyers is less than this amount.
   - "Value" sets the minimum amount of money you are willing to accept for the entire "Qty" of bandwidth. (Therefore the floor price for a single unit is this "Value" divided by the total "Qty".)
   Changes to these values take effect immediately and affect the next auction round.
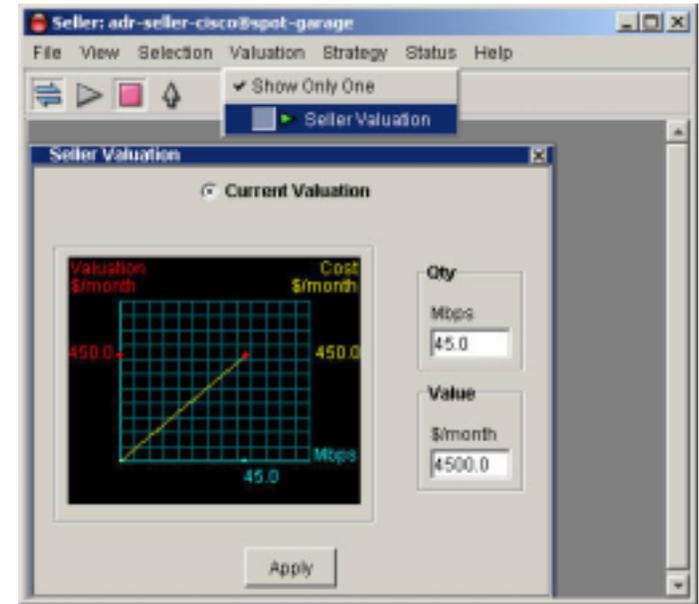
Figure 7: The Seller Valuation Window

Setting the Strategy

There are two strategies you can use in the Spot market: Static and Dynamic. Use Dynamic Seller strategy unless your administrator advised you to use Static Seller strategy.

Dynamic Seller strategy sets the unit price for all buyers, at the end of an auction, to the unit price of the last unit of bandwidth sold. It creates an artificial bidder designed to always lose at the highest possible price and for the highest possible quantity. After a round of bidding, Merkato's Progressive Second Price auction mechanism sets the price for the winner to the price offered by the highest bidding losing bidder. With the Dynamic Seller strategy, the artificial bidder is always the highest bidding losing bidder.

(For a complete explanation, see *Seller's Reference Manual*, "Merkato Auction Mechanism: The Progressive Second Price Auction.")

- To activate the Dynamic Seller strategy, select the Current Strategy radio button in the Strategy window. (See Figure 8.)
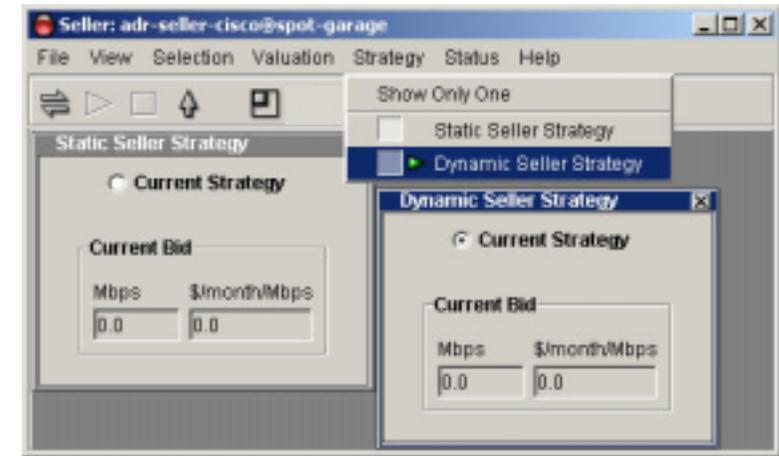
Figure 8: The Seller Strategy Windows

Auction Parameters Set by the Administrator

Besides setting the seller's valuation and strategy, which you configure, there are parameters for the Spot auction that the Merkato administrator configures.

The Merkato administrator sets the following parameters:

Time Between Auctions

Bandwidth bought at spot auction is allocated until the next auction ends. You can specify the length of time between auctions. The duration of the auction itself is not affected.

Total Bandwidth Capacity

The administrator sets the total bandwidth your network is capable of sending. This is the maximum quantity you can offer for sale in the combined Spot and Reservation markets.

Bandwidth Available for Reservation Market/Spot Market

The bandwidth you want to sell can be apportioned between the Spot and Reservation markets. How you apportion it determines the amount available for reservations and the amount sale in the spot market. You can have the administrator implement only the Spot market or only the Reservation market.

Types of Valuations You Can Make Available to Buyers

Buyers specify how they value bandwidth by entering price and quantity in fields in the valuation window. There are a variety of methods of Buyer valuation, but your administrator configures which are available to each buyer.

For a complete description of Buyer valuations, see *Merkato Buyer Reference Manual*, "Valuations Overview."

Buyer valuations include the following:

Traffic Based Bidding (For Any Type of Valuation)

Traffic Based Bidding works with any of the types of valuation listed below. If Traffic Based Bidding is enabled for a valuation, a separate tab appears in that valuation's window, as shown in Figure 9.

Enable Traffic-based bidding by selecting the **Active** check box. If Traffic-based is enabled, the Buyer agent changes the maximum quantity in its valuation by checking the usage at intervals.

Quick Response Bidding (For Any Type of Valuation)

If Quick Response Bidding is enabled for a valuation, a separate tab appears in that valuation's window, as shown in Figure 10. When Quick Response is enabled the Buyer agent reacts to bursts of traffic according to the values in two fields: When Merkato detects a level of traffic that exceeds the *Traffic Treshold*, the Buyer agent changes the amount in its Minimum Quantity field to the amount you enter in the *Est. Peak Traffic* field, plus a Quantity Margin.

Budget Valuation

The agent places the same value on all units of bandwidth offered for auction, based on a total budget.

Budget Valuation with Limits

The agent places the same value on all units of bandwidth offered for auction, based on a total budget. Buyers set the minimum and maximum bandwidth for which they will bid.

Linear Valuation

Bidding is at a constant unit price regardless of the quantity. This is similar to a take-it-or-leave-it bid. Buyers may get less quantity than they ask for, but the unit price will never exceed what they offer.

Figure 9: A Valuation Window Showing the Traffic-based Tab

Figure 10: A Valuation Window Showing the Quick Response Tab

Square Root Valuation

Similar to budget valuation except buyers lower the total cost they are willing to pay as bandwidth decreases.

Logarithmic Valuation

Buyers can use this valuation if they wish to bid aggressively at a mid-point in the quantity range and less aggressively for higher or lower amounts. The agent using this valuation bids most aggressively at 37% of the maximum quantity specified.

Parabolic Valuation

Buyers can use this valuation if they wish to bid aggressively at a mid-point in the quantity range and less aggressively for higher or lower amounts. The agent using this valuation bids most aggressively at 50% of the maximum quantity specified.

Pricing For Reservations

Reservation pricing is set using a table configured in the Resource agent. Only your Merkato administrator can make changes to this table. Figure 11 shows the reservation price table.

The following values are configurable:

- Each cell, specifying a unit price for the adjacent time period shown in the column heading and capacity amount shown in the row heading.

- Values for each time column heading

- Units for each time column heading

- Values for each quantity row heading

- Units for each quantity row heading

- The fee charged for cancellation of a reservation, a percentage of the cost of the remaining reservation.

In general, sellers offer the highest price for short reservations and for small quantities of bandwidth. They offer the lowest price for large quantities of bandwidth over long periods of time.

When a buyer requests a reservation, Merkato calculates a price based on the requested amount of bandwidth and the duration of the reservation. The reservation prices are automatically scaled between price points to prevent abrupt jumps when buyers select quantities just above or below the price point.

Your Merkato administrator can increase the number of rows or columns in the rate sheet to accommodate more price points.

The highest capacity rate and the longest time period shown in the table are the upper limits for reservations.

Cancellation Fee

In addition to the unit price for bandwidth, you may specify a cancellation fee. This fee is expressed as a percentage. It represents the percentage of the value of the cancelled portion of the contract that is charged to the buyer. For example, if the cancellation fee is 50% and the buyer cancels at the mid point of the contract, the buyer owes 50% of the original contract price (the remaining portion of the contract) times 50% (the cancellation fee), or 25% of the original contract, on cancellation. Buyers are informed of this fee in a pop-up confirmation window when they cancel an existing reservation.

Figure 11: The Reservation Pricing Table

Monitoring Sales Via the Desktop Agent

The Desktop Seller agent provides a variety of sub-windows that let you monitor market activity.

News Windows

The News window provides real-time status of your Merkato agent. It is useful when you want to get a quick summary of marketplace conditions and confirm the state of your agent.

- To enable the News window, select **News** from the Status pull-down menu.

When your agent is disconnected, you see a News window similar to the one in Figure 12.

When you are connected but not active, the News window looks like the one shown below. It indicates the bandwidth capacity you are offering and the current market price in the auction as it proceeds.

During an auction, the News window looks like the examples below.
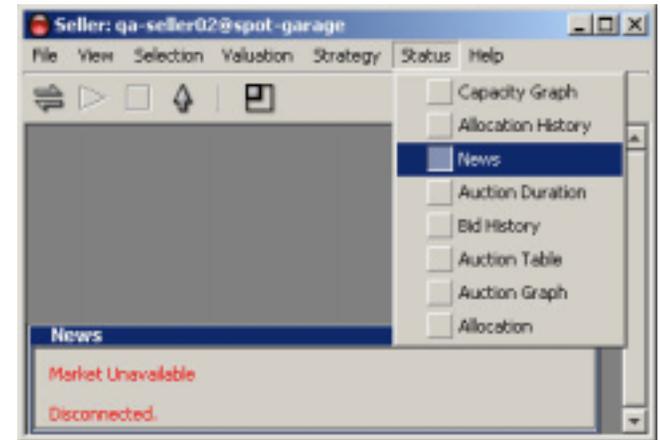
Figure 12: The News Window

Allocation Window

The allocation window (Figure 13) provides a time indicator for the current auction. Each time any buyer places a bid the timer is reset and starts counting down again. When all bidders cease bidding (either because they are satisfied with their proposed allocation or have dropped out of the bidding at the current market price), the timer counts down to zero. At that point, the Resource agent turns the proposed allocations into real allocations. This occurs during a "pause" period. The pause period is indicated by several changes to the time display: the timer label changes from "Time Left" to "Time Since," the font changing to red, and the counter counting up to the pause limit, rather than counting down, as before (as shown in Figure 14).

For sellers, the allocation display is always zero, even if the bandwidth supply exceeds demand.
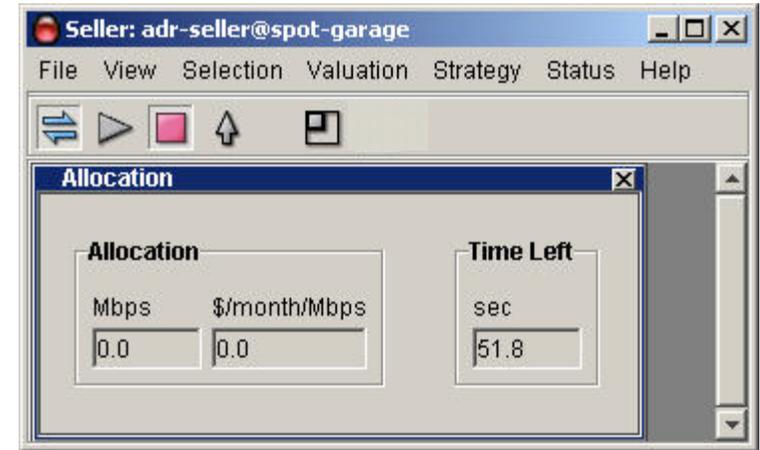
Figure 13: The Allocation Window During the Auction
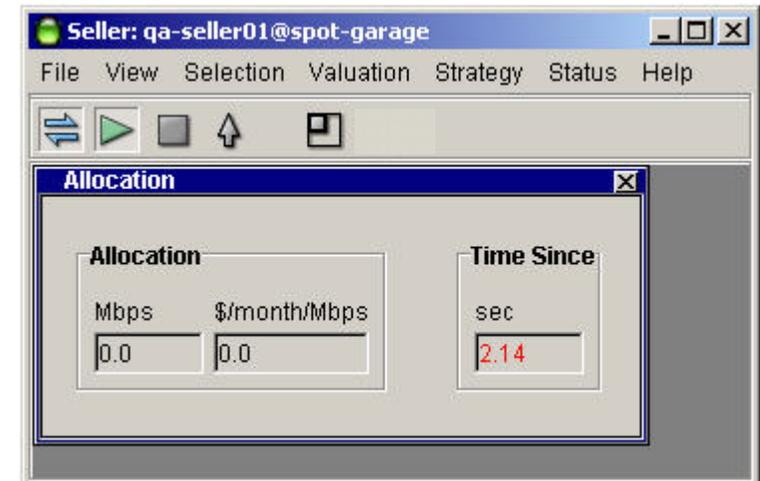
Figure 14: The Allocation Window Between Auctions

Auction Graph

You can monitor auction behavior in real time on the Auction graph.

- To enable the Auction graph, select Auction Graph from the Status pull-down menu.

For *sellers* the Auction graph looks like Figure 15.

The graph elements are:

- Auto-scaling Y-axis indicating unit price (axis is scaled to show all current bids).

- Auto-scaling X-axis indicating quantity (axis is scaled to show available quantity.

- Blue dots, representing the last bids received from all bidders (excluding a bid by the Dynamic Seller agent, which is shown as a red dot).

- A red dot, with ID number, indicating the last bid from the Dynamic Seller agent.

- Red line representing your agent's valuation curve as determined by settings in your active valuation window.

- A blue shaded area representing the allocation of bandwidth to successful bidders. This area is a series of blocks, where the height represents the unit price paid and the width represents the quantity allocated.
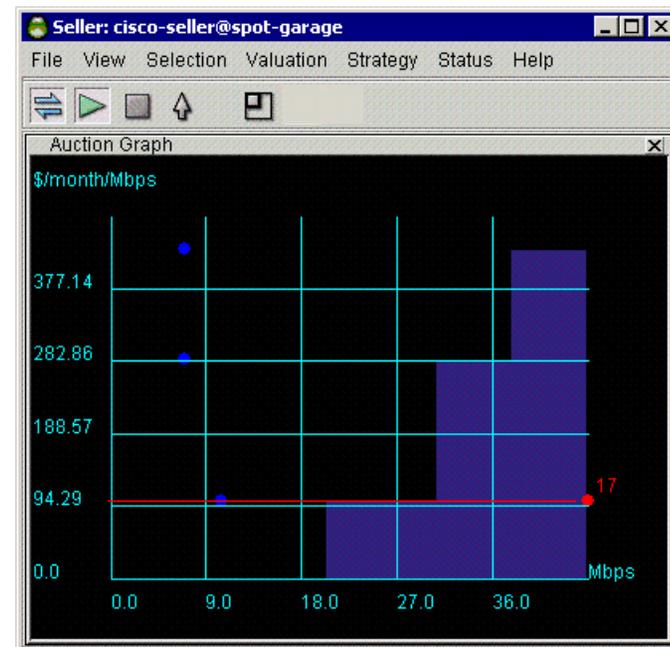
Figure 15: The Auction Graph

Clicking the right mouse button changes the scale of the unit price axis (Y axis). Note the units on the X axis in the examples shown in Figure 16. The cursor changes to indicate that the scale is expanded or contracted.
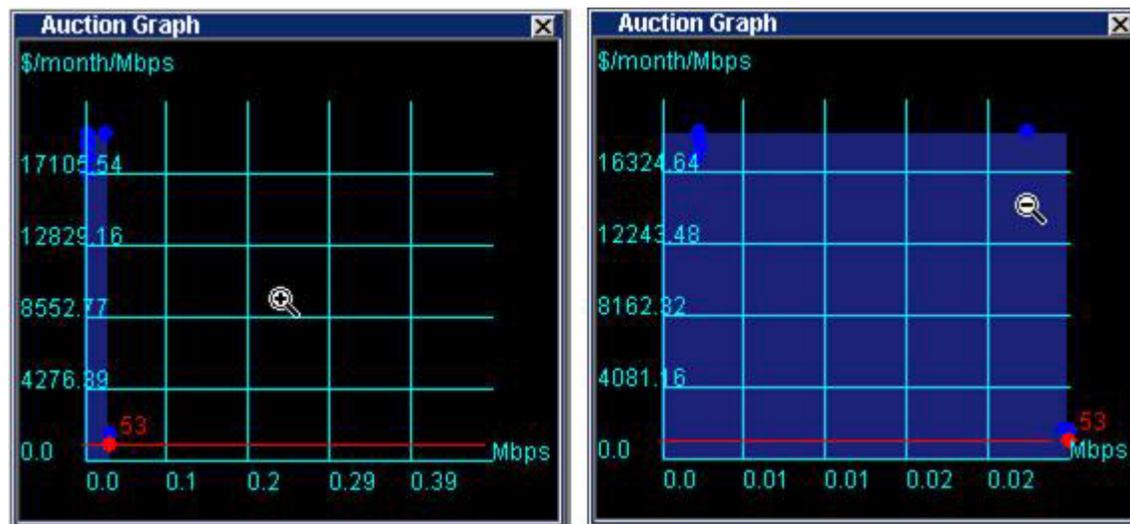
Figure 16. The Auction Graph, Showing the Effects of Scaling by Right-Clicking the Mouse

Auction Table

The Auction Table, shown in Figure 17, gives you a quantitative, real-time view of the auction in progress.

- To enable the Auction Table, select *Auction Table* from the Status pull-down menu.

- To resize the columns, click and drag column boundaries in the header

- To reorder the columns, click and drag the column headers themselves.

The columns are:

ID   The ID of the bidder. A bidder agent receives a new ID whenever it is uploaded to or downloaded from the garage.

Quantity   The quantity requested in the last bid placed (note that this may be split into multiple rows, as explained below).

Price   The price (unit price) requested in the last bid placed.

Rate   The rate represented by the bid. It is the maximum cost represented by that bid, but not necessarily the price that will be paid by the bidder.

The rows are:

Your Dynamic Seller agent's last bid is shown with in red. The last bids of all other agents are shown in black (in the blue shaded area) or in yellow (in the black area).

Any bidders that receive an allocation of bandwidth are shown in the blue shaded area. (The Dynamic Seller agent is in the blue area if bandwidth supply exceeds demand.) Any bidder who does not receive an allocation is shown in the black area. Bidders that receive only a portion of an allocation are shown in both the blue and black areas, with their quantities split accordingly.

The black area represents the basis for the actual cost paid by a buyer if the buyer's agent receives an allocation of bandwidth.

(See *Seller's User Reference*, "Merkato Auction Mechanism: The Progressive Second Price Auction.")

Figure 17: The Auction Table

Monitoring Sales Via the Express Interface

You can monitor sales from the Merkato portal as well as from the Merkato Desktop. The same information appears, but it does not update in real-time. You must refresh the display to see current activity.

Recent Allocations Table

The Recent Allocation table, shown in Figure 18, appears below the Agent panel in the Merkato portal.

For sellers, the Recent Allocation table indicates reservations and allocations made to buyers of the bandwidth you have offered. Confirmed reservations are at the top, followed by the most recent Spot market allocations. Each Spot market allocation entry contains a summary of information for an hour, which generally includes many auction rounds.

Start Time	End Time	Resource	Buyer	Seller	Quantity (Mbps)	Price ($/month/Mbps)	Cost ($)
2002-02-04 03:58:57	2002-02-04 04:25:00	demo-spot	demo-buyer3	demo-seller	4.67	272.66	0.77
2002-02-04 03:58:57	2002-02-04 04:25:00	demo-spot	demo-liz	demo-seller	18.18	272.66	2.99
2002-02-04 03:58:57	2002-02-04 04:25:00	demo-spot	demo-buyer1	demo-seller	9.40	272.66	1.55
2002-02-04 03:58:57	2002-02-04 04:25:00	demo-spot	demo-buyer6	demo-seller	3.78	272.67	0.62
2002-02-04 03:58:57	2002-02-04 04:25:00	demo-spot	demo-nemo	demo-seller	0.79	272.72	0.13
2002-02-04 03:58:57	2002-02-04 04:25:00	demo-spot	demo-buyer5	demo-seller	3.78	272.67	0.62
2002-02-04 03:58:57	2002-02-04 04:25:00	demo-spot	demo-buyer2	demo-seller	3.78	272.67	0.62
2002-02-04 03:58:57	2002-02-04 04:25:00	demo-spot	demo-buyer4	demo-seller	0.62	272.74	0.10
2002-02-04 02:59:46	2002-02-04 03:58:57	demo-spot	demo-buyer3	demo-seller	4.67	272.66	1.74

Figure 18: The Recent Allocation Table in the Merkato Portal, Below the Express Interface

Allocations are shown in order; most recent at the top. The columns are as follows:

Start Time	The start date and time for this allocation (in 24 hour military time)
End Time	The end date and time for this allocation (in 24 hour military time)
Resource	The name of the bandwidth product allocated
Buyer	The Buyer agent that won the allocation
Seller	The Seller agent that sold the allocation
Quantity (Mbps)	The bandwidth quantity for this allocation (for Spot market allocations, the average quantity obtained over the time period indicated)
Price ($/month/Mbps)	The unit price for this allocation (for Spot market allocations, the average price obtained over the time period indicated)
Cost ($)	The bottom-line cost for this allocation (for Spot market allocations, the total cost over the time period indicated)

Traffic Screen

To open Traffic screen click the **Traffic** link on the left of the Portal. The traffic screen appears in Figure 19.

For a Seller agent, the Traffic page shows the combined amount of data all buyers have transferred through the Merkato network control point.

Three charts are provided to represent three time scales:

- Daily chart showing 5 minute granularity

- Weekly chart showing 30 minute granularity

- Monthly chart showing 2 hour granularity

All three charts are based on five-minute sample intervals. Merkato gathers traffic statistics in both the input and output directions every five minutes. Each five-minute sample represents an average over that five-minute period. In other words, peaks lasting less than five minutes are not accurately represented in the charts. These five-minute samples are used directly in the daily chart. These values are then combined into longer averages for the weekly and monthly charts.

The green-shaded portion of the chart indicates traffic in the incoming direction. Traffic indicated by the blue line is in the outgoing direction.

Below each chart are three columns of figures indicating the maximum, average, and current values for the period displayed.
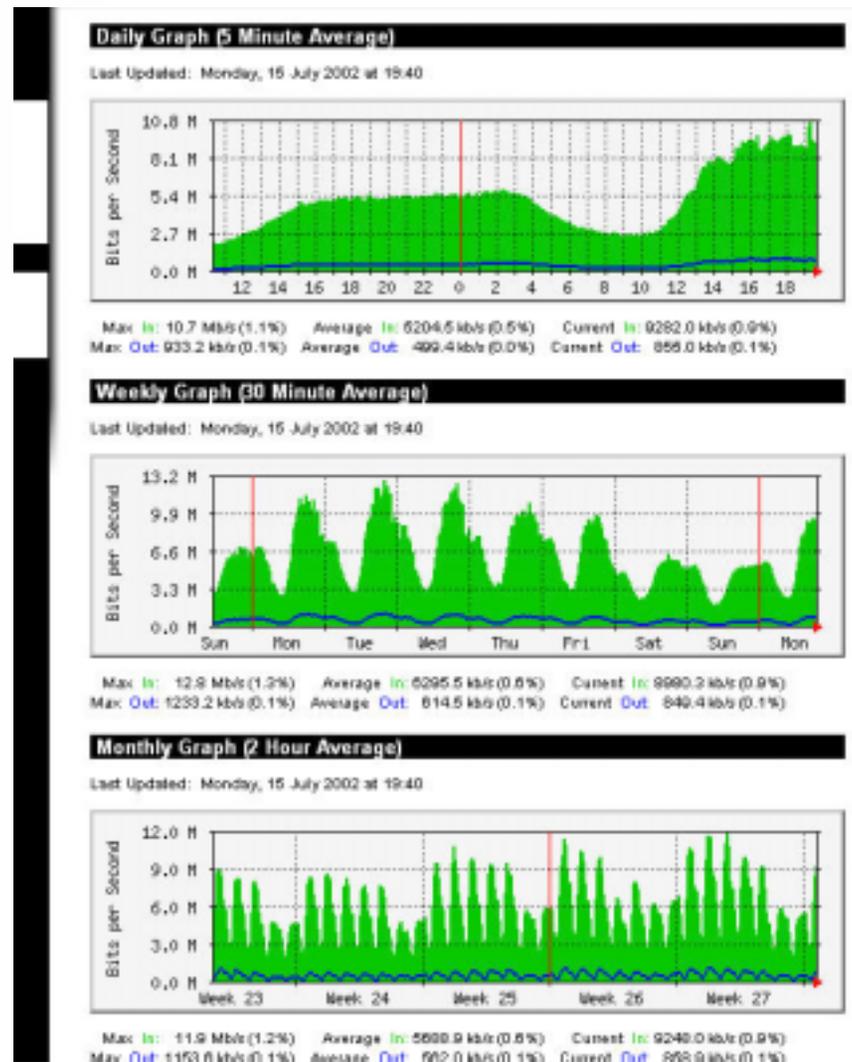
Figure 19: The Traffic Screen

Charge Reports

Merkato's Charge Reports feature lets you see details about bandwidth allocations you have made. The reports it generates provide all the details about each allocation, but they are also summarized.

The Charge Report selection form allows you to select start and end dates and select the type of report. (See Figure 20.)

Rather than enter the dates manually, click on the small calendar icon to the right of the field (▦). A pop-up calendar appears (Figure 21), from which you can select query start and end dates.

Select the beginning date by selecting a month and year from the pull-down menus and then clicking on a calendar date. The date appears in the From field.

Repeat this procedure for the To field.

Click the Resource icon (◕). A list box appears from which you can select a resource on which to do billing queries:
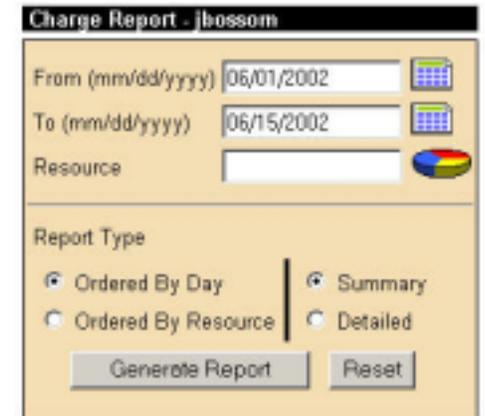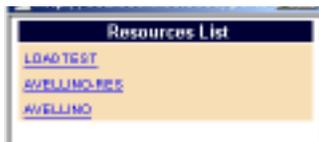
Figure 20: The Charge Report Selection Form

Figure 21: The Pop-Up Calendar

The selection boxes on the Report Type panel control how the information is displayed on the screen.

For example, if you select Ordered by Resource and Detailed and click **Generate Report**, the view looks like the one shown in Figure 22.

Figure 22: Sample Charge Report Set to Summary, Ordered By Day

If you select Ordered by Resource, check Detailed, and click **Generate Report**, the charge report appears broken down by date, as shown in Figure 23.

Details for qa-resource-resv01

Resource	Seller	Buyer	Date	Quantity (Mbps)	Price ($/month/Mbps)	Allocation Time (hours)	Cost ($)
qa-resource-resv01	qa-seller01	ard000	2002/06/11	0.00	300.00	24.00	0.02
qa-resource-resv01	qa-seller01	julia0	2002/06/11	0.00	300.00	24.00	0.01
qa-resource-resv01	qa-seller01	ard000	2002/06/12	0.00	299.93	24.00	0.01
qa-resource-resv01	qa-seller01	ard000	2002/06/15	0.02	272.80	24.00	0.14
qa-resource-resv01	qa-seller01	julia0	2002/06/15	0.00	299.95	24.00	0.03
qa-resource-resv01	qa-seller01	ard000	2002/06/16	0.10	262.99	24.00	0.88
qa-resource-resv01	qa-seller01	jbossom	2002/06/16	0.04	298.09	24.00	0.36
qa-resource-resv01	qa-seller01	ard000	2002/06/17	0.09	262.99	24.00	0.78
qa-resource-resv01	qa-seller01	ard000	2002/06/18	0.01	239.36	24.00	0.11
qa-resource-resv01	qa-seller01	julia0	2002/06/18	0.02	297.16	24.00	0.18
qa-resource-resv01	qa-seller01	ard000	2002/06/19	0.06	239.35	24.00	0.47
qa-resource-resv01	qa-seller01	julia0	2002/06/19	0.01	271.61	24.00	0.07
qa-resource-resv01	qa-seller01	ard000	2002/06/20	0.00	300.53	24.00	0.00
qa-resource-resv01	qa-seller01	julia0	2002/06/20	0.00	274.13	24.00	0.01
qa-resource-resv01	qa-seller01	ard000	2002/06/21	0.02	278.10	24.00	0.21
qa-resource-resv01	qa-seller01	ard000	2002/06/22	0.12	275.93	24.00	1.09
qa-resource-resv01	qa-seller01	ard000	2002/06/23	0.29	275.93	24.00	2.61
qa-resource-resv01	qa-seller01	ard000	2002/06/24	0.00	0.00	24.00	-0.00
qa-resource-resv01	qa-seller01	ard000	2002/06/25	0.00	0.00	24.00	-0.00

Summary for qa-resource-resv01

Resource	Seller	Quantity (Mbps)	Price ($/month/Mbps)	Allocation Time (hours)	Cost ($)
qa-resource-resv01	qa-seller01	0.04	249.94	456.00	6.97

Figure 23: Sample Charge Report Set to Detailed, Ordered By Resource

Transaction Data

The Transaction Data view allows you to query the accounting database. (See Figure 24.) When you click **Generate Data,** Merkato prompts you to download a file to your PC.

You can read this file in a spreadsheet program or as plain text. (See Figure 25.)

The seven columns are the following:

- Start time of the allocation (mm/dd/yyyy hh:mm)

- End time of the allocation (mm/dd/yyyy hh:mm)

- Buyer Agent

- Resource (the source of the bandwidth that was sold)

- Quantity

- Price (in dollars per month per Mbps)

- Cost of allocation (in dollars—the amount billed)

The following fields appear in the Transaction Data screen:

From (mm/dd/yyyy): Enter the date you want the charge report to begin on.

Resource: (optional) Enter the resource (from whom you have received allocations) whose charges to you will appear in the report.

Ordered By Time: A report ordered by day lists charge information from all resources separated by each day.

Ordered By Resource: A report ordered by resource lists charge information from each individually.
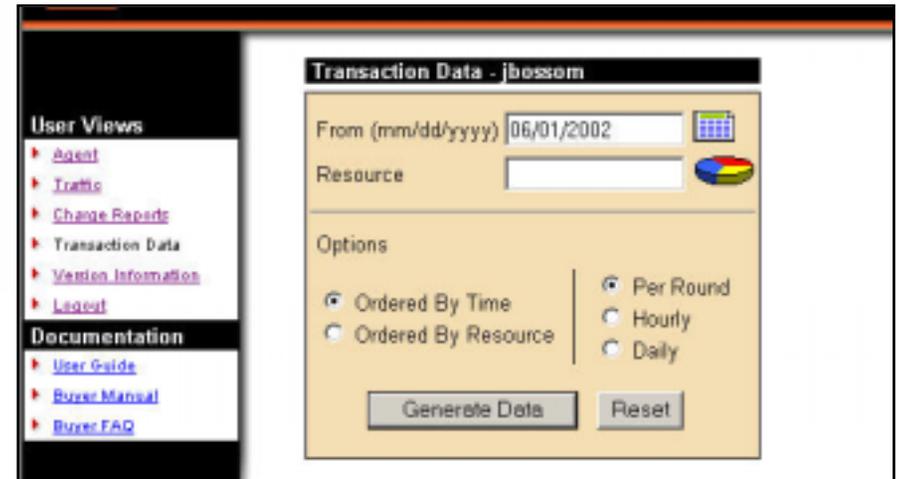
Figure 24: The Transaction Data Selection Window

Figure 25: Sample Transaction Data Report

Glossary

agent: The program that interacts with the rest of Merkato on behalf of buyers and sellers. Buyers can acquire bandwidth by configuring their agents to offer the price they are willing to pay for a range of available quantity, or use their agent to request a quote for a fixed-price bandwidth reservation. Sellers configure their agents with a quantity of bandwidth for sale and a minimum price they are willing to accept for that quantity.

allocation: An amount of bandwidth available for your use. Depending on the type of service being offered through Merkato, this can represent the maximum bandwidth available to you or a minimum guarantee of bandwidth available to you.

bandwidth: The amount of data transmitted or received per unit of time. When we refer to acquiring or selling bandwidth, we mean the amount of information that can be sent over a connection at one time, at the allowed speed, without packet loss or excessive delay. Bandwidth is measured in bits-per-second.

bumping: Bumping occurs when a user logs in using the ID and password of an active agent. The user who is logging-in sees a message that an agent with this login ID is already active. If the new user procedes, the old user is disconnected. The agent uses the saved configuration of the agent, not necessarily the configuration of the previously active agent.

Buyer agent: The program that interacts with the rest of Merkato on behalf of buyers. Buyers can acquire bandwidth by configuring their agents with the price they are willing to pay for a range of bandwidth (on the spot market), or with a time-frame and desired quantity (on the Reservation market). In a Merkato auction, Buyer agents signal what they are willing to pay for bandwidth in the form of bids, consisting of a unit price and a quantity.

capacity: In the Merkato interface, the term capacity refers to the total amount of bandwidth available from the Seller.

data transfer rate: The speed at which data is transferred from one port to another. See Kbps, Mbps, and Gbps.

Desktop agent: The Merkato application for buyers or sellers that runs on a Windows PC. Merkato desktop agents bid for bandwidth from the user's PC using a Java-based application. Alternatively, Merkato agents can run as an application on a server, called the "Garage." Users can interact with these remote agents through an HTML browser interface.

Express agent: The Merkato HTTP application for buyers or sellers that configures and obtains status from Merkato agents running from a remote location. Accessing the agent in this way is an alternative to bringing the agent to the user's desktop and using the Java-based interface. The Express agent is accessible through the Portal.

floor price: The lowest price the seller will accept for bandwidth. The seller can establish the floor price through the Seller agent.

garage: A feature on the Merkato server where player (Buyer and Seller) agent configuration profiles reside. The gararge stores agent configurations whether the players are active or not.

Gbps: One of the ways of expressing units of bandwidth; Gigabits-per-second (1,000,000,000 bits-per-second).

Java: A programming language, useful for internet and networking applications. The environment used for the Merkato Desktop Interface.

kbps: One of the ways of expressing units of bandwidth–kilobits-per-second (1,000 bits-per-second).

market price: The price for something that buyers and sellers agree on. Merkato establishes a market price for bandwidth during each spot market auction round. There is a fixed amount for sale, so as demand increases, prices rise. Ordinarily, the market price is reached when the cumulative demand of all the buyers is equal to the amount of bandwidth being offered by the seller.

Mbps: One of the ways of expressing units of bandwidth–Megabits-per-second (1,000,000 bits-per-second).

Merkato desktop: The Merkato desktop is the first window that appears when the user begins to bring the Merkato buyer or seller agent to their desktop. It lets users specify which Merkato agent or agents they want to download to the desktop.

Merkato: InvisibleHand's software platform, which dynamically prices, sells, and allocates IP bandwidth in real time. Merkato means "market" in Esperanto.

Player: A buyer or seller in the Merkato auction.

Portal: The main access point to all Merkato applications. It is an HTML-based interface accessible from a standard web browser.

progressive second price auction: The unique market mechanism by which Merkato allocates bandwidth to potential buyers at an optimal market price. An auction is established, where each bid consists of a unit

price and the quantity desired at that price. Bidders are ranked according to the unit price they offer. Bidders who get an allocation pay the unit price offered by the highest bidder who does not get an allocation. (This is the "second price" aspect of the auction.) Bidders who don't get an allocation can re-bid at a higher unit price, in an attempt to improve their ranking in the auction. (This is the "progressive" aspect of the auction.) An auction round closes when all bidders are either successful, based on their last bid, or cannot match the price offered by the current lowest successful bidder.

PSP: See "progressive second price auction."

Reservation market: The Merkato market mechanism by which a specified quantity of bandwidth, for a specific duration, is sold for a firm price specified by the seller and agreed to by the buyer. This is an automated process based on a rate sheet that the seller establishes in advance.

Resource agent: The program that manages the Merkato marketplaces.

Seller agent: The program that interacts with the rest of Merkato on behalf of sellers. Sellers configure their agents with a quantity of bandwidth capacity for sale and a minimum price for that quantity. Buyer agents then express what they are willing to pay for bandwidth in the form of bids, consisting of a unit price and a quantity. Currently, there is no seller agent for the Reservation market, but one will be supported in a future release.

Seller strategy: A window in the Seller desktop interface, either static or dynamic. Dynamic Seller strategy sets prices based on the last unit of bandwidth sold. Static Seller strategy sets prices based on the difference between what the Seller would have received without each bid.

Spot market: The Merkato mechanism by which bandwidth is traded, in a progressive second price auction. An optimal fair market price is established and bandwidth is allocated to buyers, based on their bids relative to other buyers.

Spot Market agent: A Buyer agent or Seller agent connected to a spot market. There are also reservation agents (for buyers only).

valuation: The value a buyer or seller places on bandwidth. Setting a valuation is part of setting a purchasing strategy. Valuation settings within a buyer agent let buyers specify the amount they are willing to pay for varying amounts of bandwidth. This information is used by the agent to respond to changing market conditions during a Merkato progressive second price auction.

Wizard: In Merkato, an automated series of inquiry screens that walks you through the process of creating and configuring a Spot market Buyer agent.