<Ch a p t e r **2**

Quota Manager Scenarios

This module describes a number of quota manager scenarios.

# Information About Quota Manager Scenarios

This module describes a number of scenarios in order to better understand how the quota manager works and to understand the messages between the subscriber manager (SM) and the service control engine (SCE).

Quota Preservation across Subscriber Sessions

This section describes the means by which subscriber quota is preserved across sessions. Figure 2-1 shows this scenario.

Figure 2-1   Quota Preservation across Subscriber Sessions
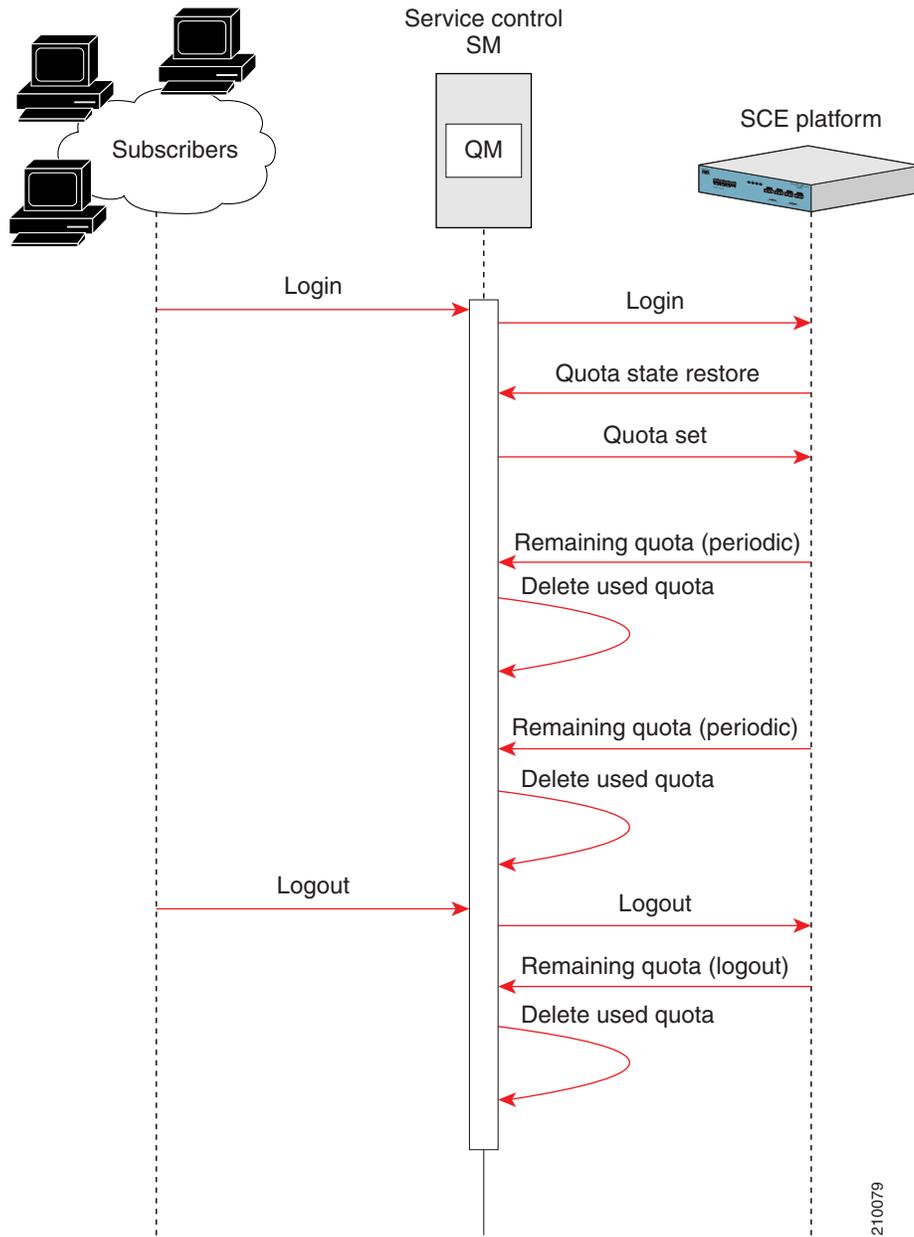
In this scenario, the subscriber first logs into the SM. The SM then performs a logon operation to the SCE, which responds with a Quota State Restore indication. This indication is a request by the SCE to the SM to find out how much quota the subscriber has remaining. The SM queries the database and then responds to the SCE with a Quota Set operation. This sets the amount of quota that is allocated to the subscriber based on the subscriber package and the associated quota profile.

During the subscriber session and while the subscriber is consuming quota, the SCE sends Remaining Quota indications. These are periodic and the frequency at which they are sent is defined when configuring the PQB with the Service Control Application for Broadband (SCA BB) Console. As the SM receives each Remaining Quota indication, the quota manager removes the required amount of quota from the subscriber buckets.

Note   A higher rate of Remaining Quota indications will result in a higher accuracy for the subscriber quota value. However, it will also increase the number of management messages on the network.

When the subscriber session is finished, the SM performs a logout operation on the SCE, which responds with a Remaining Quota indication. The SM will use the value contained in the indication to delete the quota consumed by the subscriber. The quota value is then written to the database to be stored until the subscriber next logs in.

Note   The quota is subtracted from the subscriber quota account only after the quota is consumed, not when it is provisioned. This ensures that in cases of SCE failover, the quota inaccuracy is calculated in favor of the subscriber.

Aggregation Period Changeover

This section describes the actions taken for each subscriber when a new aggregation period begins. Figure 2-2 shows this scenario.

Figure 2-2   Aggregation Period Changeover
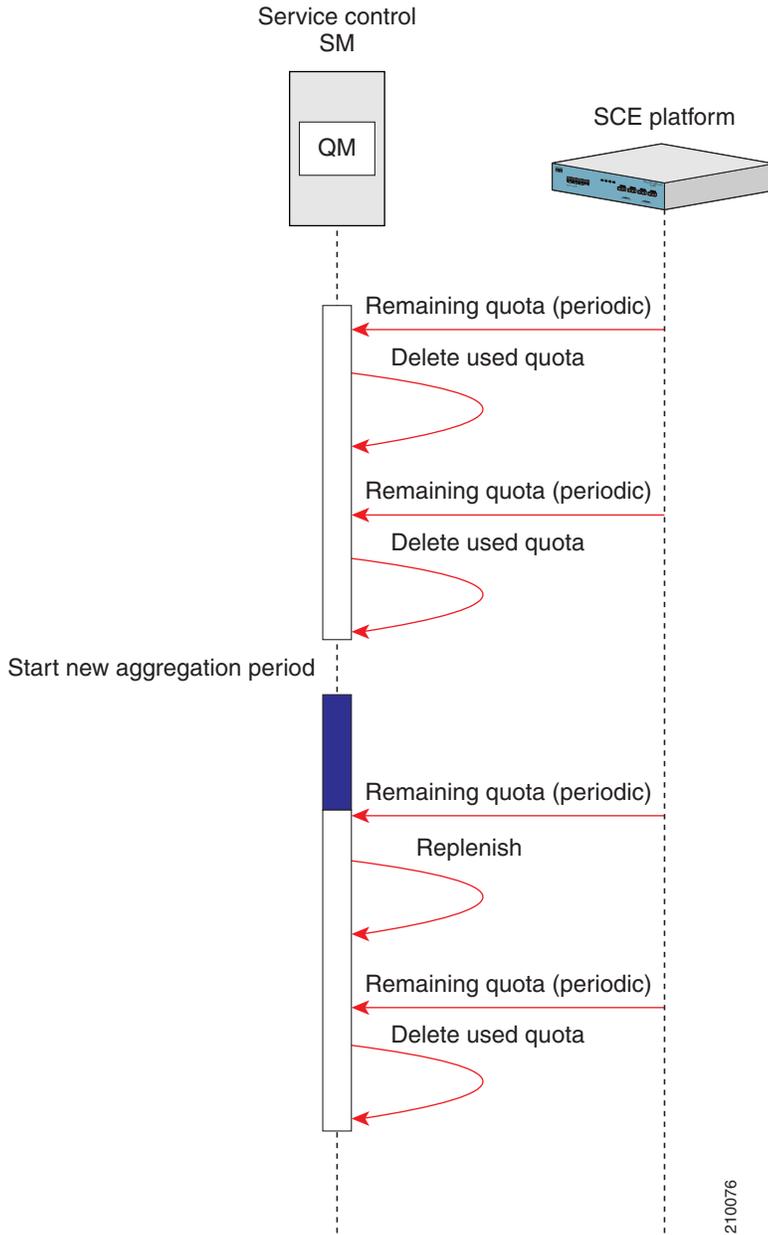
This scenario assumes that the subscriber is already logged in and consuming quota. The top half of the figure shows the SCE generating the Remaining Quota indications and the SM removing the used quota from the subscriber buckets. According to the package and the associated quota profile, at some point, a new aggregation period will start. At a point in time after the start of the new aggregation period, the SCE will send a Remaining Quota indication. When the SM receives this indication, it will replenish the subscriber buckets with the quota amounts defined by the quota profile.

Note   Due to the configuration of the SCE, the first Remaining Quota indication may not occur immediately when the new aggregation period begins. This period of time is highlighted in blue in the above figure. The quota consumed in this time period is consumed from the quota allocated to the previous aggregation period. The inaccuracy of the quota value is less than or equal to the quota dosage and is dependent on the rate of the remaining quota indications. This is a limitation of the application.

Note   If the rate at which Remaining Quota indications are sent is high, the subscriber quota will be replenished at a time in close proximity to the new aggregation period start time. However, this will increase the number of management messages on the network.

Quota Breach

This section describes the actions taken in the event that a subscriber completely depletes his quota. Figure 2-3 shows this scenario.

Figure 2-3   *Quota Breach*
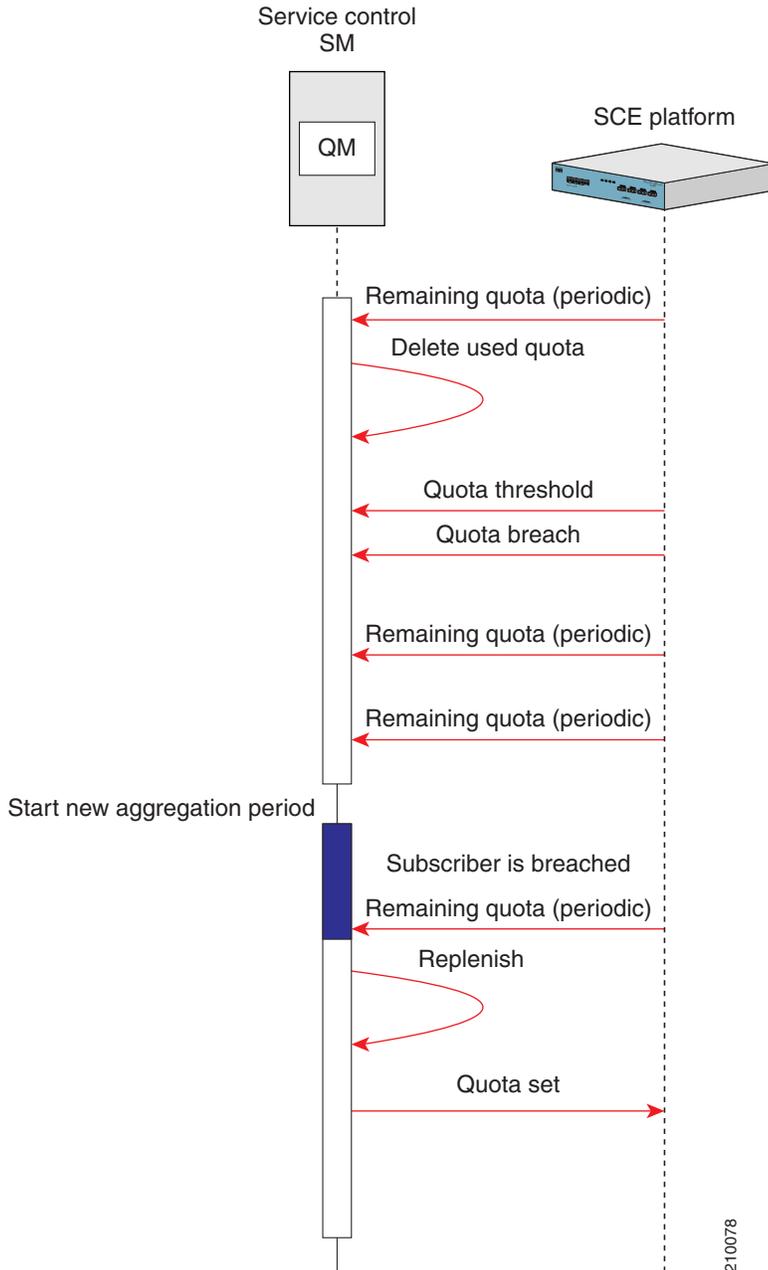
In this scenario, the subscriber is consuming data from the quota buckets and the SCE is generating Remaining Quota indications. When the quota reaches a configurable threshold value, the SCE sends a Quota Threshold indication. In cases where the subscriber can be granted more quota, a quota set operation will be performed. In this case, there is no more quota available for the subscriber. The subscriber continues to consume quota until the quota buckets are empty at which point the SCE will send a Quota Breach indication. At the same time, the post-breach action, which was configured in the SCA BB Console, will be applied for the subscriber.

Once a new aggregation period starts, the subscriber is eligible for more quota. However, quota will be replenished only after the quota manager receives the Remaining Quota indication. Once the quota is replenished, a quota set operation is performed and the subscriber can now continue consuming quota.

Note   Due to the configuration of the SCE, the first Remaining Quota indication may not occur immediately when the new aggregation period begins. This period of time is highlighted in blue in the above figure. Because the subscriber is breached and the first Remaining Quota indication has not yet arrived, the subscriber is not able to consume quota. This is the only case where quota inaccuracy is not in favor of the subscriber.

Quota Accuracy

The accuracy of the quota levels for any subscriber is one of the most important aspects of the quota manager. When provisioning quota using an external server, there is a tradeoff between quota accuracy and the number of network messages.

Quota inaccuracies may occur during the changeover from one aggregation period to the next, or due to SCE failover. The level of inaccuracy depends on the configuration of the following parameters:

- Rate of the periodic remaining quota indications
- Quota dosage value

During an aggregation period changeover, the following occurs until the first quota indication is received in the new aggregation period:

- Any quota consumed by the subscriber is subtracted from the previous aggregation period.
- The quota dosage value limits the size of any quota error.
- The interval between the remaining quota indications limits the length of time during which consumed quota is subtracted from the previous aggregation period.

In cases of SCE failover, the following occurs between the last quota indication in the failed SCE and the first quota indication in the new active SCE:

- Any quota consumed by the subscriber is not removed from the subscriber buckets.
- The quota dosage value limits the size of any quota error.
- The length of time during which quota is consumed is limited by the interval between the remaining quota indications.

In all cases of inaccuracy, the quota remaining is calculated in favor of the subscriber. The exception is when the aggregation period changeover occurs when the subscriber quota is already breached.

To maximize accuracy, configure the rate of the periodic remaining quota indication to a high value, and configure the size of the quota dosage to a small value. Note that such a configuration causes performance degradation due to the high number of messages being generated in the network.

Chapter 2   Quota Manager Scenarios

Information About Quota Manager Scenarios