PacketController Burst For Subscriber

Version: 7.0.9

Updated: Jan. 2021

PacketController Network

Disclaimer

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Problems

Before we dive into technical details of burst, let's take a look at the problems ISPs run into in terms of shared subscriber bandwidth management: how can I achieve good user experience for more subscribers with less link capacity.

Let's break it down with one example, 20 subscribers share one 10Mbps residential bandwidth pool.

1. ***User experience***: How can I make sure those 20 subscribers can do web browsing, mail etc. without complaining the slow internet speed?
2. ***More subscribers***: How can I put as many as subscribers in 10Mbps bandwidth pool without sacrifice of user experience?
3. ***Less link capacity***: How can I achieve 1# and 2# with 10Mbps rather than 20Mbps pool?

User Behaviors

Without good user experience, ISP business would fail.

What are the typical user behaviors when accessing Internet?

1. ***High bandwidth usage for short time***: When one user browses twitter, the web page opening would take 2Mbps or even more bandwidth for several seconds, then the user just reads twitter and no bandwidth utilized for next several minutes. This is one typical behavior of internet users. This behavior will NOT impact other subscribers in the pool.
2. ***High bandwidth usage all the time:*** Unfortunately, there is other typical behavior of internet users, like downloading large file by P2P or watching online movies. And this can consume the bandwidth all the time. This behavior will certainly bring every subscriber in bandwidth pool slow.

Those 2 behaviors can happen randomly on any subscribers any time.

- How can I make sure the subscribers can get high bandwidth usage for several seconds?
- How can I solve the issue that 2# doesn't interfere with 1#.

The solutions to those 2 above problems are critical for user experience. And also, it is the answer for more subscriber with less link capacity.

Solutions

PacketController provides 3 possible solutions:

- ***Balanced bandwidth pool***: The speed of subscribers in the pool is equally divided by online subscribers, for instance, if 1 subscriber in 10Mbps pool is online, s/he can get 10Mbps. If 20 subscribers online, each can get 512Kbps (10Mbps/20). Since balanced bandwidth pool doesn't take actual usage into consideration, it is not recommended.
- ***Burst***: This solution can mostly mitigate the problems here.
- ***Intelligent QoS***:The multi-tiered kickdown policies to pace down the speed of heavy users (high bandwidth usage all the time).

What Is Burst

Burst, by its definition, is to allow subscriber to consume **MORE** speed than **NORMAL** speed for **A LIMITED PERIOD OF TIME** when ***SOME CONDITION MET***.

Take the example above into consideration, when overall usage of 10Mbps bandwidth pool is less than 9Mbps each one of 20 subscribers in 10Mbps bandwidth pool can get 2.5Mbps for 15 seconds, after that it can only get 1Mbps at maximum.

Let's break it down.

- ***Burst condition***: when overall usage of 10Mbps bandwidth pool is less than 9Mbps. This is the condition when we allow more speed. Because when 10Mbps bandwidth pool is more than 9Mbps, its quite busy and we just can't afford to give subscriber more speed otherwise there will be congestion and all the subscribers in this pool would suffer.
- ***Burst bandwidth***: Each subscriber in the pool can get 2.5Mbps, and 2.5Mbps is the burst bandwidth. It allows subscribers to utilize more bandwidth
- ***Burst Timeout***: 15 seconds, this is a limited period of time we allow burst bandwidth. Together with burst bandwidth, it can result in better user experience.
- ***Normal speed***: 1Mbps, this is the normal speed AFTER subscriber bursts to 2.5Mbps for 15 seconds, apparently, we need to restore the normal speed after burst. This can alleviate the problem caused by behavior of high bandwidth usage all the time.

The burst solution can do much to mitigate the issues of shared subscriber.

- The subscriber can get more bandwidth for a limited period of time when s/he is doing regular web browsing, mail etc. and this can significantly improve the user experience.
- More bandwidth for a limited period of time like 15 seconds will not have impact on network so it makes more subscriber/less link capacity possible.
- Restored to normal speed can alleviate the long-time bandwidth occupation caused by bad behavior like downloading large files.

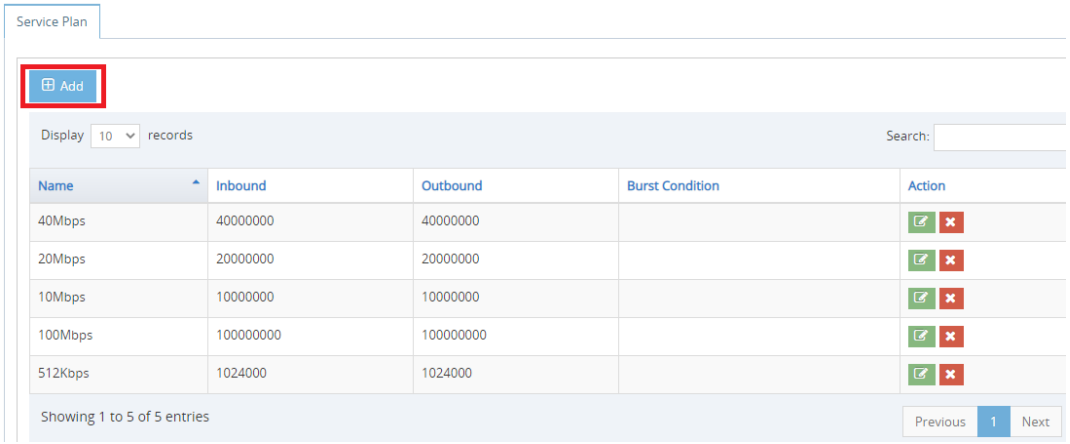
Configuration Overview

The following are the sample configuration and it includes:

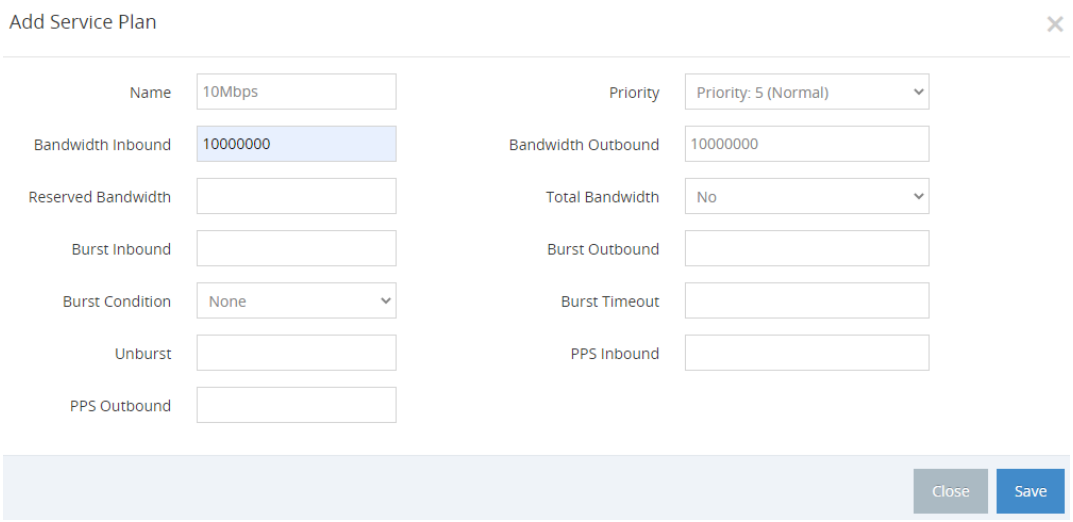
- Add one service plan for user group
- Add 10Mbps user group (aka bandwidth pool) with burst condition (9Mbps)
- Add one service with burst
- Add subscribers

Service Plan for User Group

- Click Subscriber -> Service Plan and click **Add** Button



- Input name and bandwidth inbound/outbound

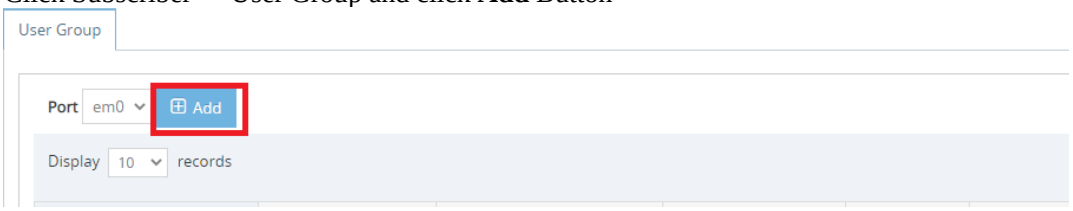


- Click **Save** button

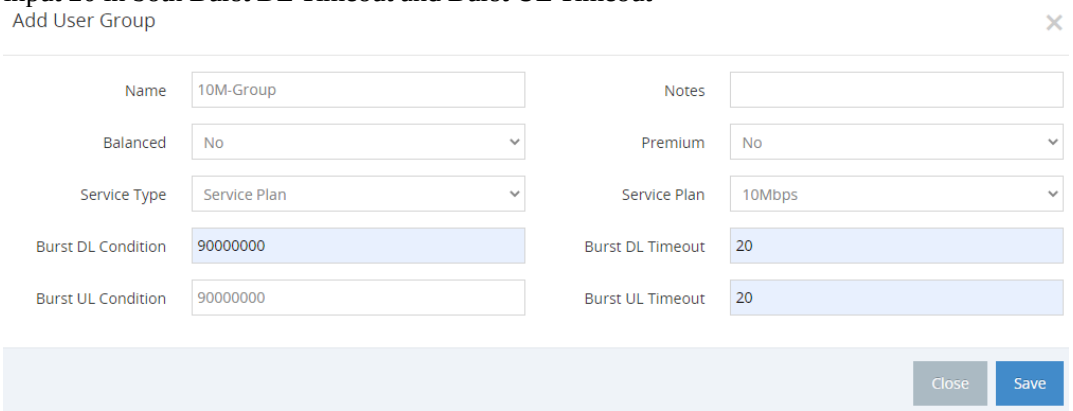
***Notes:* The parameter of bandwidth inbound/outbound is bps.**

User Group

- Click Subscriber -> User Group and click **Add** Button



- Input name, select Service Plan in Service Type dropdown and select 10Mbps in Service Plan dropdown, input 90000000 in both Burst DL Condition and Burst UL Condition, input 20 in both Burst DL Timeout and Burst UL Timeout



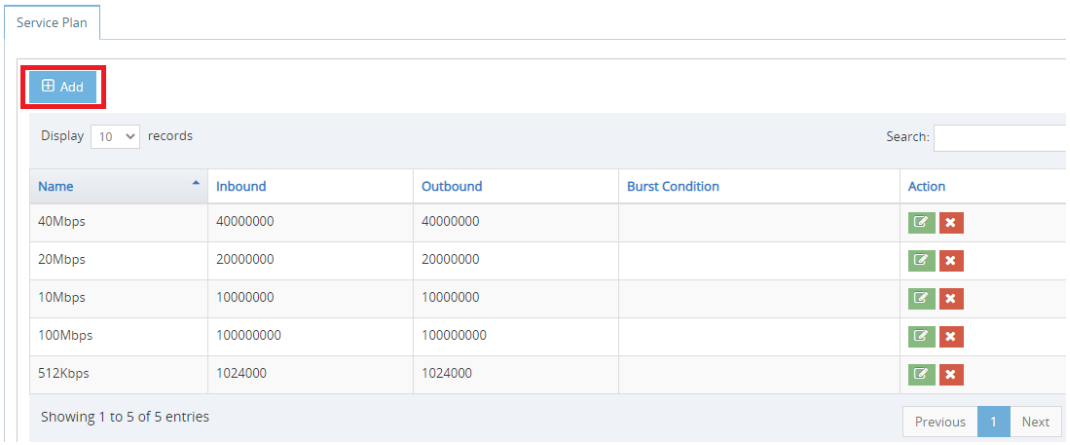
- Click **Save** button

***Notes:* The burst condition (9Mbps) is defined in Burst DL Condition and Burst UL Condition, and it supports asymmetrical settings. The Burst DL/UL Timeout (in seconds) is the average over the period for Burst DL/UL Condition. 20 is recommended.**

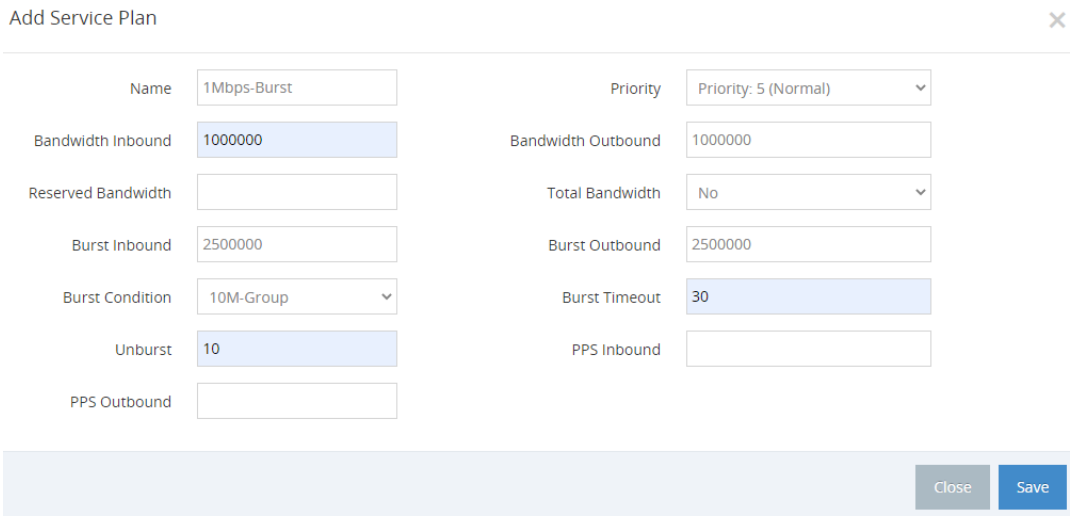
The setting above means this user group is capped with 10Mbps and we use 9Mbps of this user group as the burst condition, which will be used in the following service plan.

Service Plan with Burst

- Click Subscriber -> Service Plan and click **Add** Button



- Input name, input 1000000 in both Bandwidth inbound/outbound, input 2500000 in both Burst Inbound/Outbound, select 10M-Group in Burst Condition dropdown, input 30 in Burst Timeout and 10 in Unburst

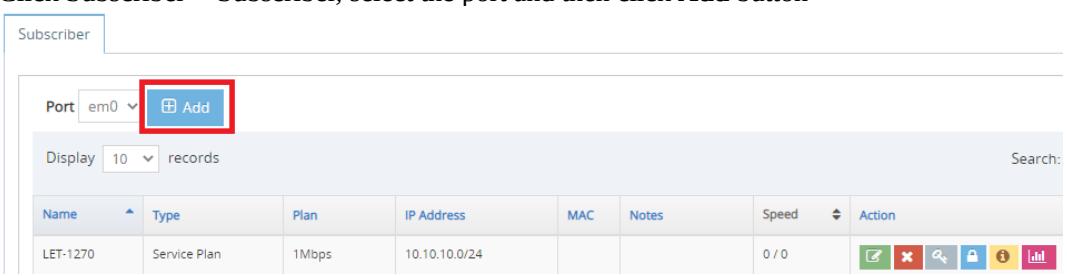


- Click **Save** button

Notes: **The burst (2.5Mbps) is defined in Burst Inbound/Outbound, and it supports asymmetrical settings. The burst condition is set to 10M-Group added in previous step. The limited period of time for burst (in seconds) is set in Burst Timeout, 30-60 is recommended. 10 is recommended for Unburst setting.**

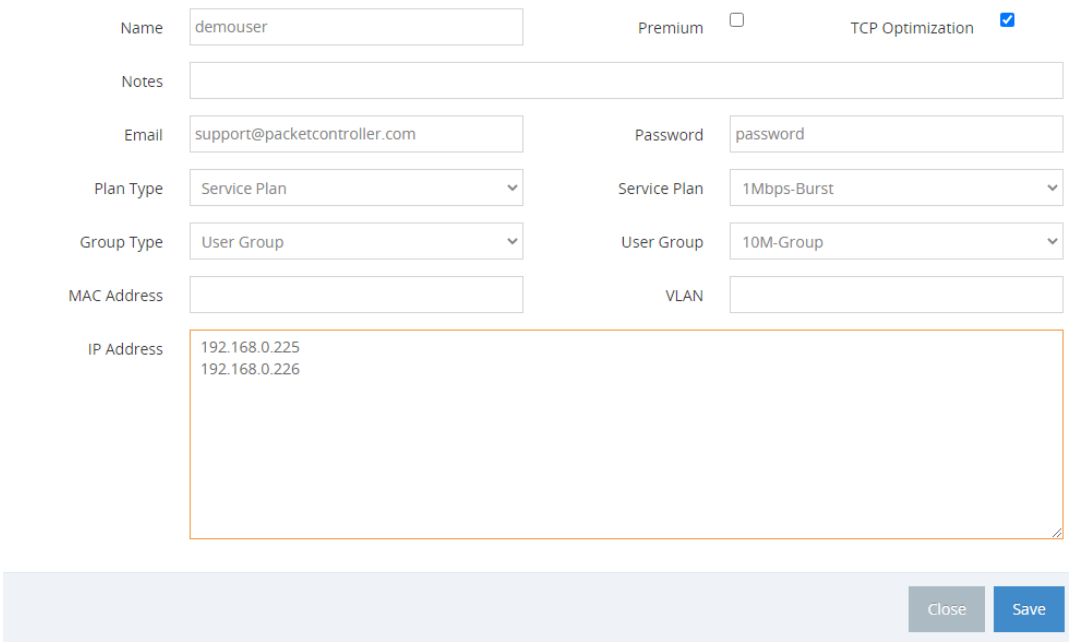
Add Subscriber

- Click Subscriber-> Subscriber, select the port and then click **Add** button



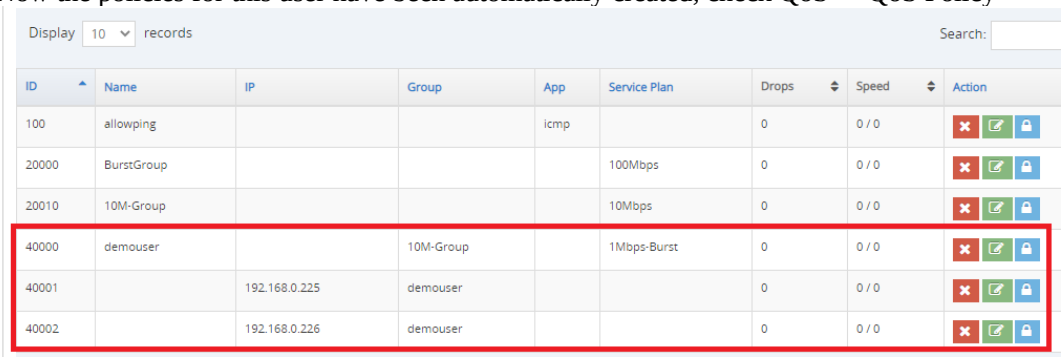
- Please fill in the forms of this user as below, select **Service Plan** in Plan Type dropdown

and **1Mbps-Burst** (added in previous step) in Service Plan dropdown, select User Group in Group Type dropdown and then select 10M-Group in User Group dropdown



Notes: Select TCP Optimization for subscriber in most case.

- Click **Save** button
- Repeat the procedures to all other subscribers to this user group (10M-Group)
- Now the policies for this user have been automatically created, check QoS -> QoS Policy



***Notes:* It is recommended to have all the subscribers to utilize the SAME service plan for the same user group.**

Advanced

Burst can be great tool to save bandwidth and achieve good user experience for ISP. The following are some points you might want to be aware of to use burst right.

Burst Timeout

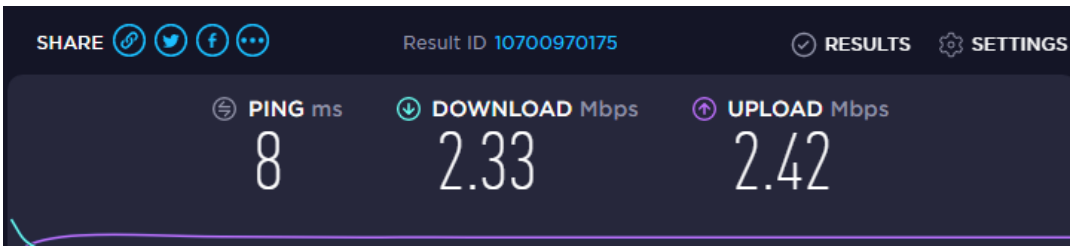
How much period of time is appropriate? There is no easy answer to this question since every network is different, but 15-60 seconds are used most.

You don't want to give more than 60 seconds for burst since long-time burst will consume your uplink and it would definitely degrade the service.

Speedtest Compatible

Speedtest is the tool for subscriber to verify that they are getting what they pay for.

Take a look at the following example: the subscriber got 1Mbps normal speed and 2.5Mbps burst for 20 seconds. The speedtest shows 2.5Mbps.



That means 2.5Mbps burst for 20 seconds can actually do 2.5Mbps in speedtest. And this is significant for ISP to sell 1Mbps package which can be claimed as 2.5Mbps package.

What happens when burst done

Once burst bandwidth utilized for burst timeout, there is a period of time (by default 10 seconds) to be waited that the subscriber is allowed to be bursted again.

From subscriber point of view, when s/he utilized burst after a limited period of time, its speed is back to normal speed, then wait for 10 seconds to be bursted again.

- The blue line is burst and after its utilized for 30 seconds, the speed is restored to normal speed in red line.
- After 10 seconds, and if the speed is under normal speed, it can be bursted again. If the subscriber keeps downloading big files, there will be no burst.

Can I use burst with Contention ratio

Currently it's not supported since contention ratio is dynamic bandwidth pool, there is no way to automatically decide the burst condition on it, hence no burst.

When do I use asymmetrical burst

Asymmetrical settings on burst condition, burst and normal speed are supported. It depends on the network, for instance, satellite link might need to give less upload than download burst.

What about subscriber keeps downloading

Burst can't do much to solve this issue, when subscriber keeps downloading and s/he will eventually be limited to normal speed. There is no automatic knock down. Please refer to Intelligent QoS feature which is designed to provide multi-tiered pacing down on heavy users.

How about dedicated subscriber

Burst can be used for both shared and dedicated subscriber. The difference is the burst condition, for shared subscriber normally the burst condition is set on user group while for

dedicated package normally the burst condition is set on overall network usage.

For instance, you got 1Gbps uplink, when overall usage is less than 900Mbps, 20Mbps dedicated subscriber can be bursted to 30Mbps for 60 seconds.