HTB Implementation on RouterOS QoS

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Introduction

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  - Wireless ISP - www.citra.net.id
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Outline

- Basic Concept
- Simple HTB
- Terms in HTB
- Common Mistakes
- More detail information

Basic Concept

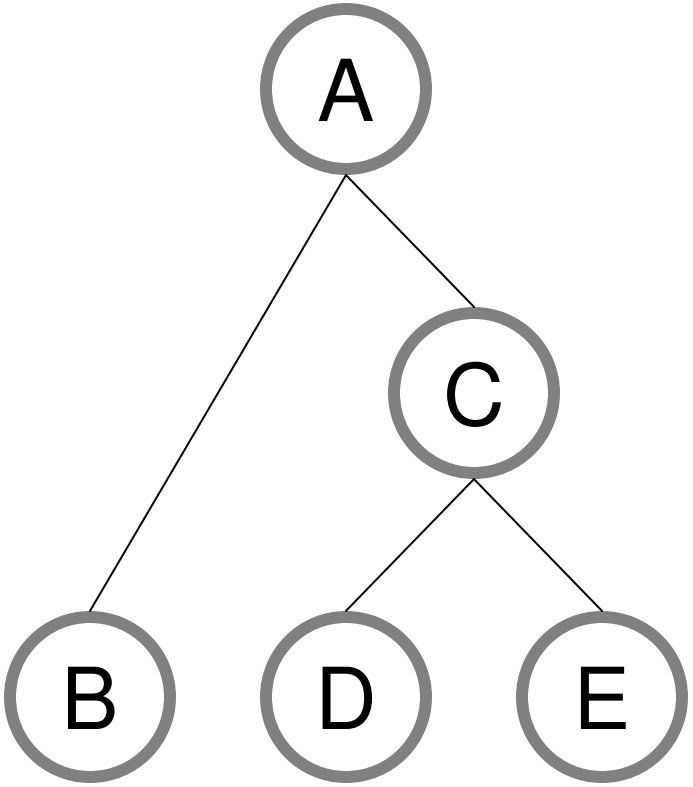
- QoS in RouterOS is not only about bandwidth limitation, but how to distribute the bandwidth fairly
- Things have to consider:
  - How to mangle
    - Check packet flow and firewall documentation on manual and wiki pages
    - Will not covered in this presentation
  - HTB (Hierarchical Token Bucket)

Basic Concept

- HTB (Hierarchical Token Bucket) is part of QoS, to make a hierarchical queue structure and determine relations between queues (priority, burst possibility, etc)
- HTB is meant as a more understandable, intuitive and faster replacement for the CBQ qdisc in Linux.
- HTB assigned to any physical interface or virtual interface (global-in, global-out, global-total)

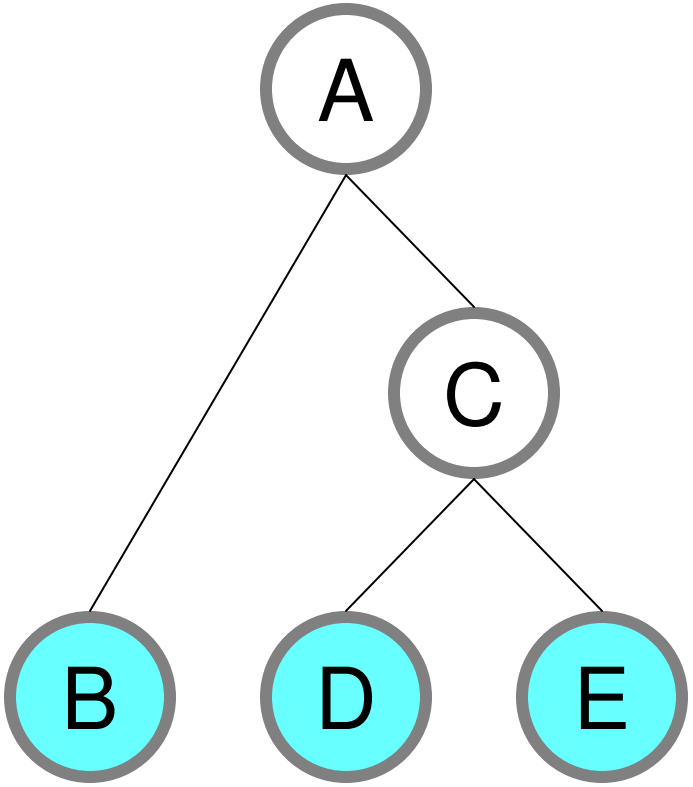
Sample of HTB

- A has 2 children :
  - B
  - C
- C has 2 children :
  - D
  - E



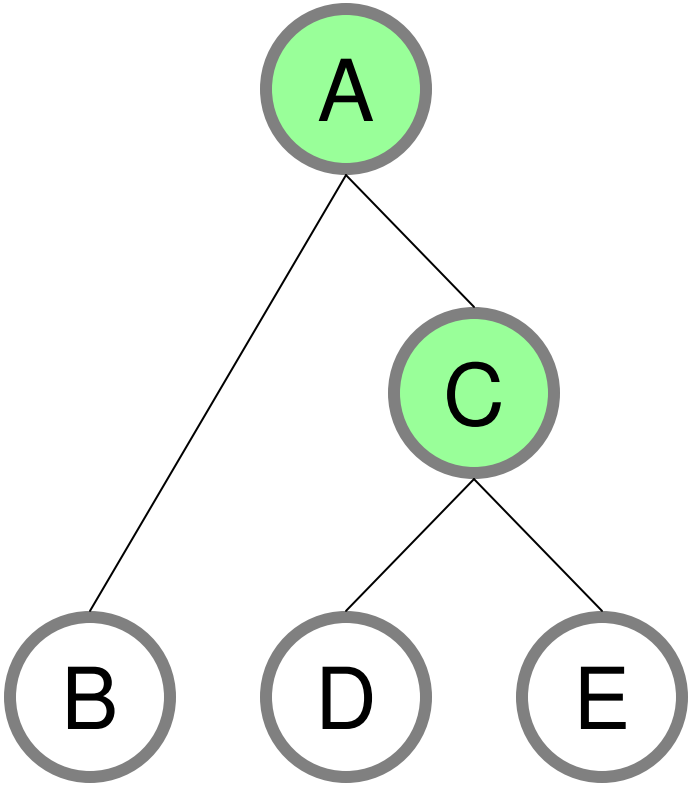
Type of Queues

- Leaf queue
  - Most lower level, has no child
  - Make actual traffic consumption
  - All leaf queues are treated on equal basis
  - All leafs located on the most bottom level of HTB



Type of Queues

- Inner queue
  - Have at least one child
  - Responsible only for traffic distribution



Terms in HTB

- Committed Information Rate (CIR)
  - Limit-at in RouterOS
  - In worst case scenario, flow will get this amount of traffic no matter what (assuming we can actually send so much data)
  - CIR works on both leaf and inner queue

Terms in HTB

- Maximal Information Rate (MIR)
  - Max-limit in RouterOS
  - Rate that flow can get up to, if there queue's parent has spare bandwidth

Terms in HTB

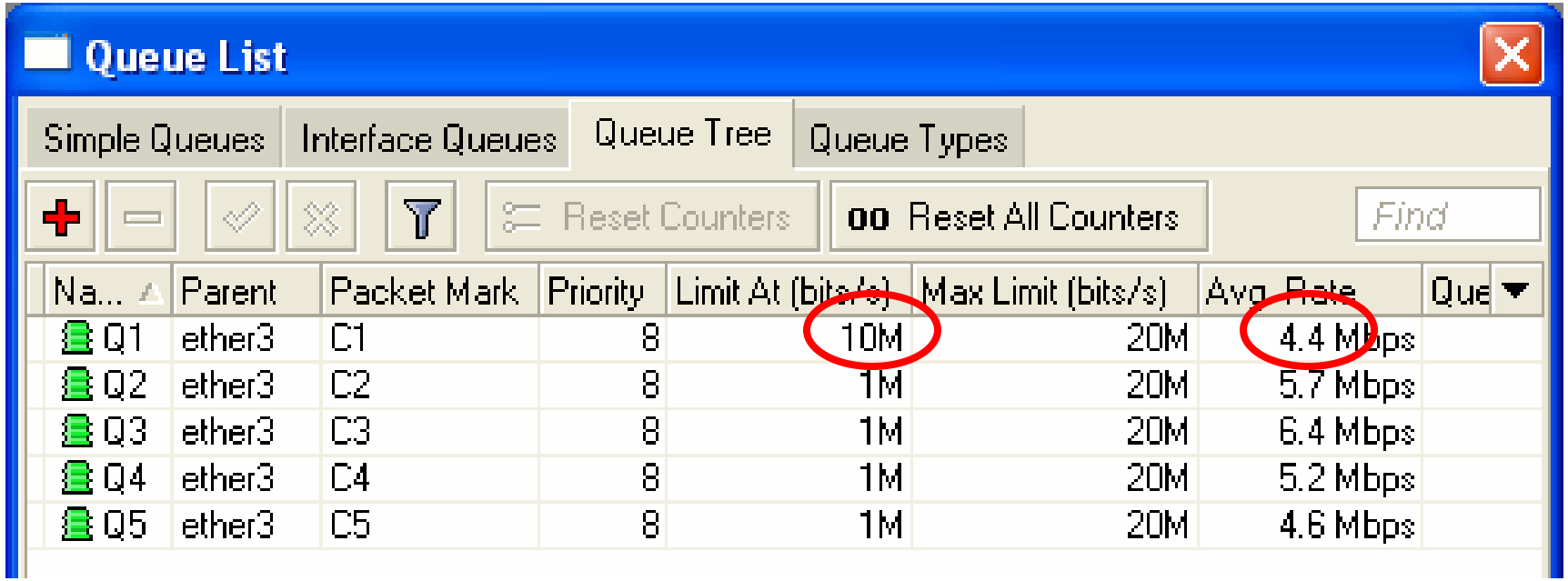
- Priority
  - Work only for leaf (child) queue
  - 1 .. Highest priority, and 8 … lowest priority
  - Priority will work only if limits are specified
  - Priority calculated only after limit-at achieved

Sample Configuration

- We have 5 leaf queues:

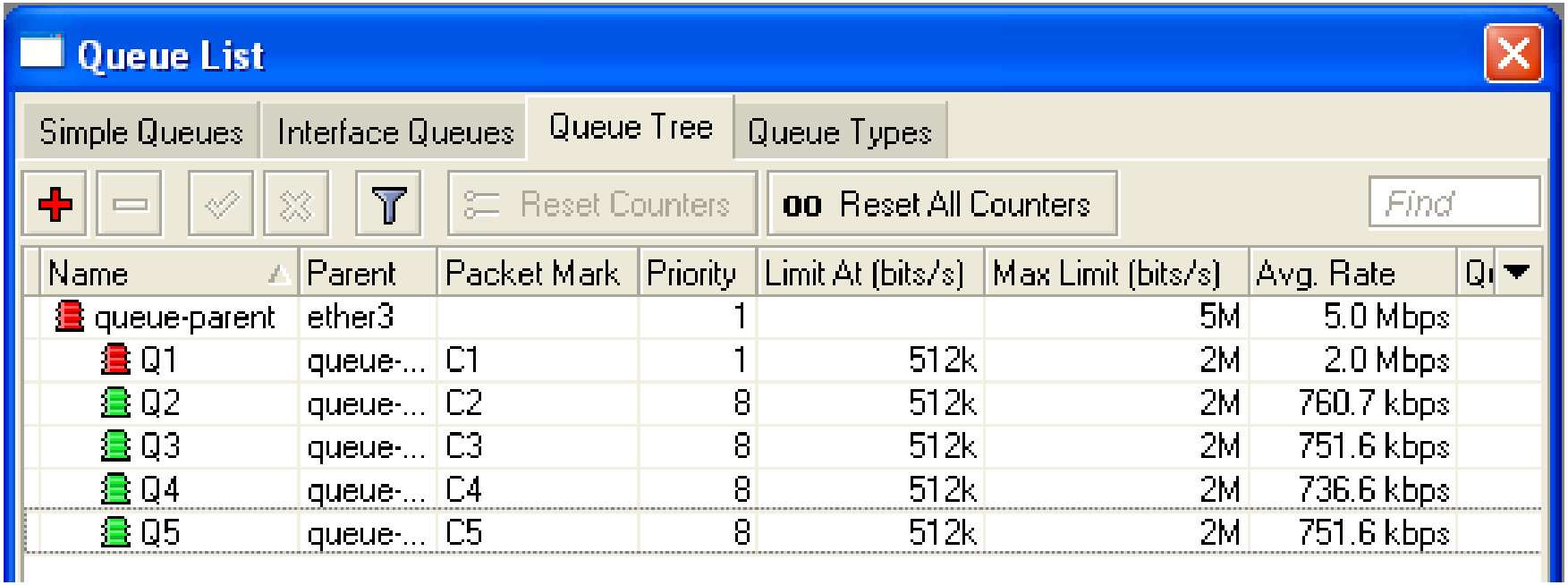
Queue	Limit-at	Max-limit
C1	10M	20M
C2	1M	20M
C3	1M	20M
C4	1M	20M
C5	1M	20M

Winbox Configuration

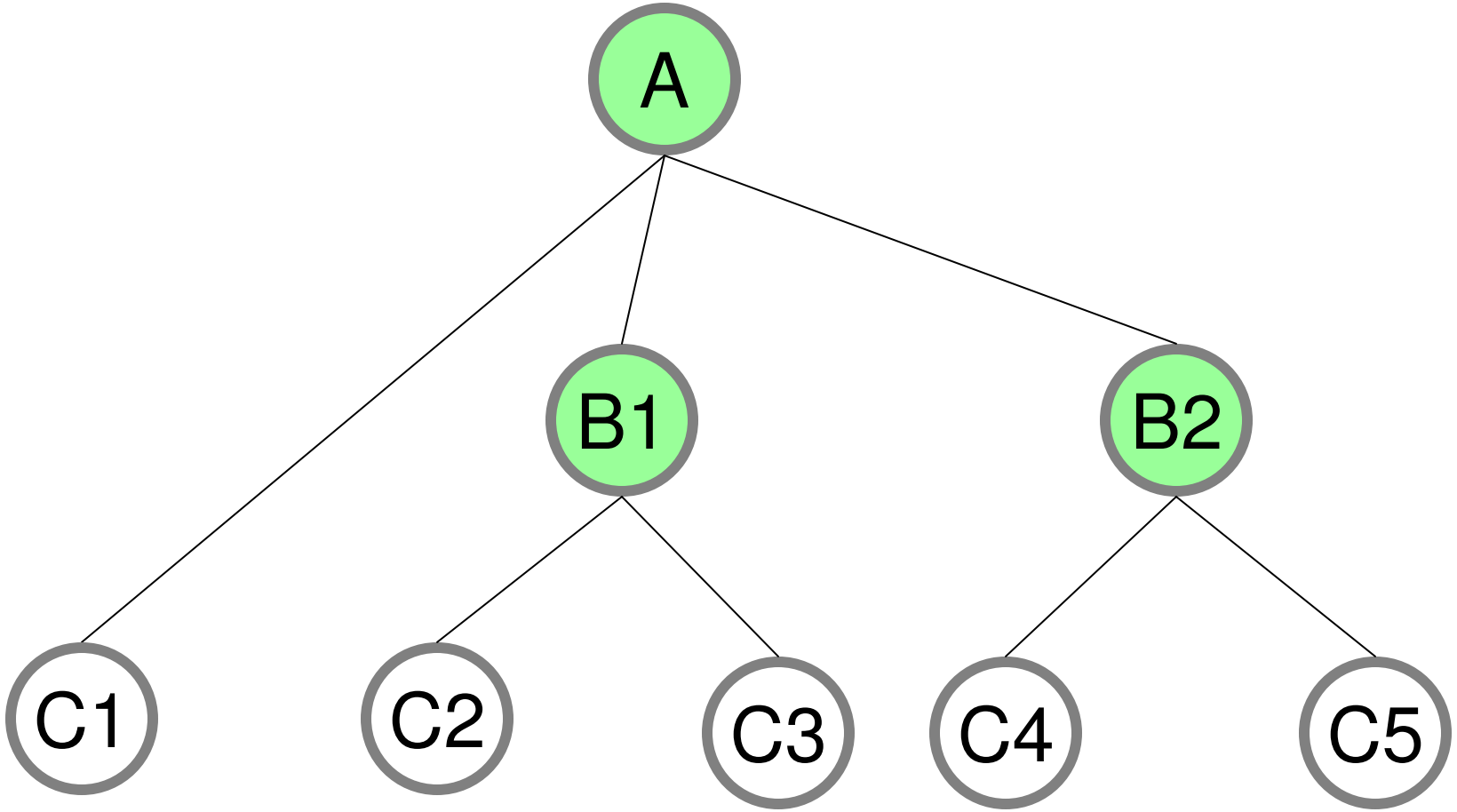


Router fail to give C1 limit-at (10M)

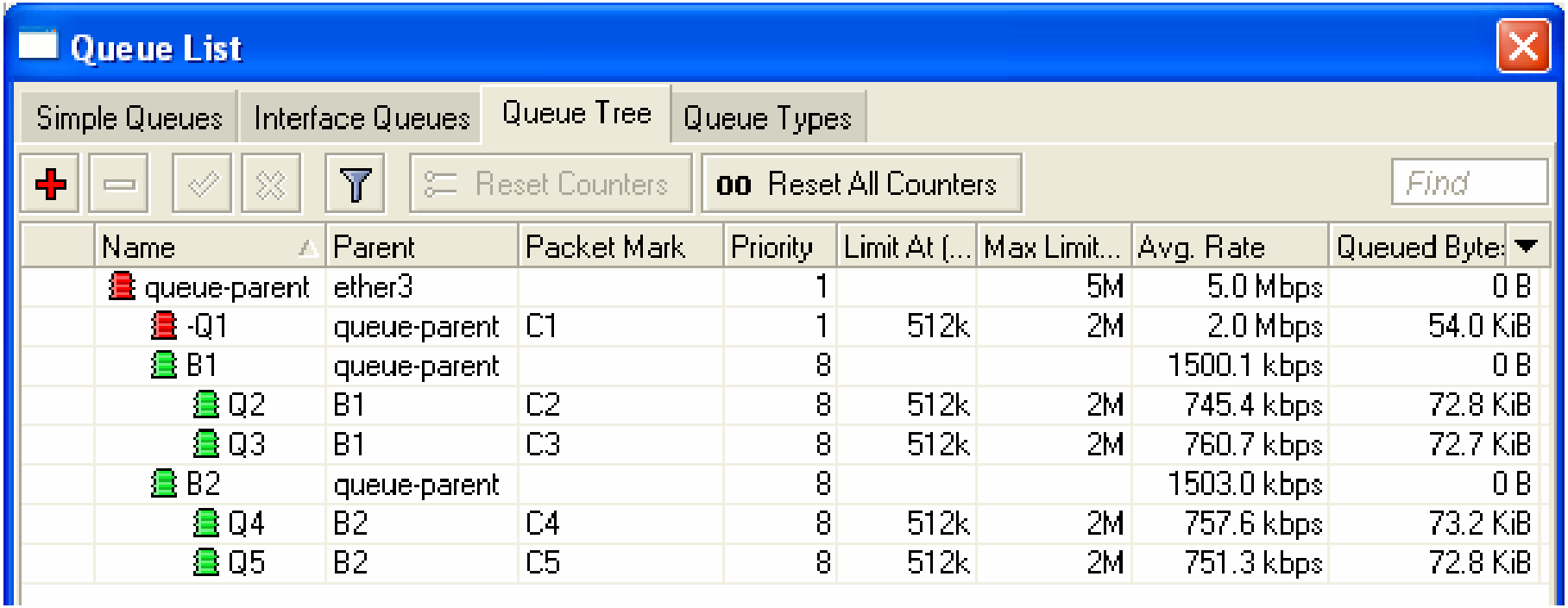
With Parent


Queue List
Simple Queues
Interface Queues
Queue Tree
Queue Types
Reset Counters
Reset All Counters
Find
Name
Parent
Packet Mark
Priority
Limit At (bits/s)
Max Limit (bits/s)
Avg. Rate
queue-parent
ether3
1
5M
5.0 Mbps
Q1
queue-...
C1
1
512k
2M
2.0 Mbps
Q2
queue-...
C2
8
512k
2M
760.7 kbps
Q3
queue-...
C3
8
512k
2M
751.6 kbps
Q4
queue-...
C4
8
512k
2M
736.6 kbps
Q5
queue-...
C5
8
512k
2M
751.6 kbps

More Hierarchy



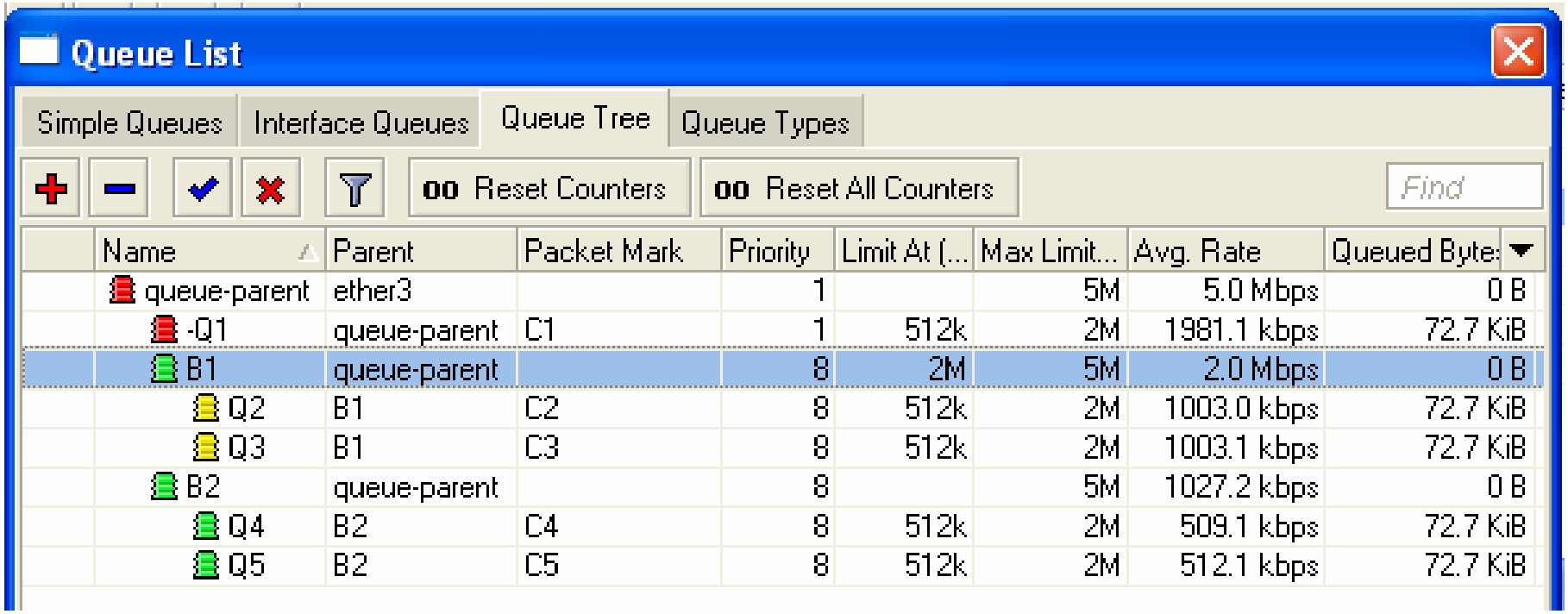
HTB



Name	Parent	Packet Mark	Priority	Limit At (...	Max Limit...	Avg. Rate	Queued Byte:
queue-parent	ether3		1		5M	5.0 Mbps	0 B
-Q1	queue-parent	C1	1	512k	2M	2.0 Mbps	54.0 KiB
B1	queue-parent		8			1500.1 kbps	0 B
Q2	B1	C2	8	512k	2M	745.4 kbps	72.8 KiB
Q3	B1	C3	8	512k	2M	760.7 kbps	72.7 KiB
B2	queue-parent		8			1503.0 kbps	0 B
Q4	B2	C4	8	512k	2M	757.6 kbps	73.2 KiB
Q5	B2	C5	8	512k	2M	751.3 kbps	72.8 KiB

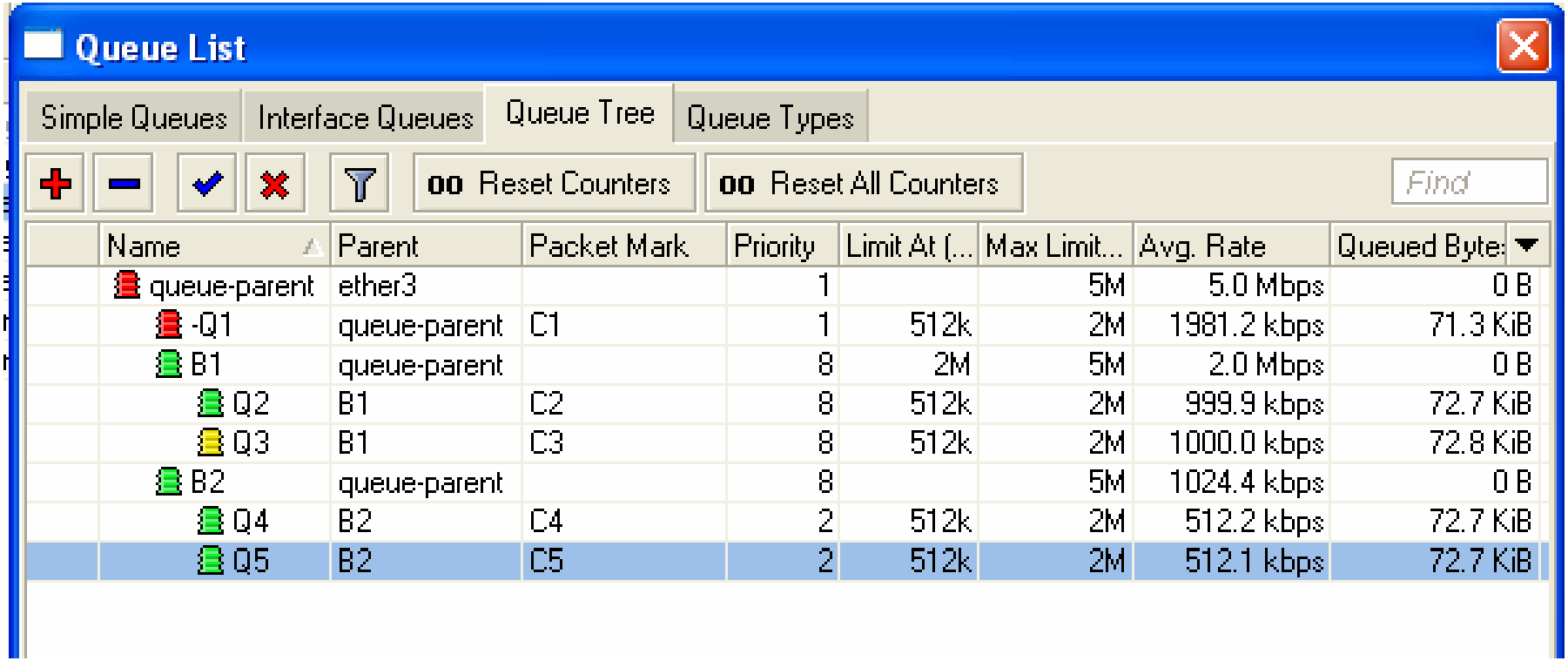
C1 have better priority, get up to max-limit, all other capacity split for other leaf queue

Limit-at on Inner Queue



Name	Parent	Packet Mark	Priority	Limit At (...	Max Limit...	Avg. Rate	Queued Byte:
queue-parent	ether3		1		5M	5.0 Mbps	0 B
-Q1	queue-parent	C1	1	512k	2M	1981.1 kbps	72.7 KiB
B1	queue-parent		8	2M	5M	2.0 Mbps	0 B
Q2	B1	C2	8	512k	2M	1003.0 kbps	72.7 KiB
Q3	B1	C3	8	512k	2M	1003.1 kbps	72.7 KiB
B2	queue-parent		8		5M	1027.2 kbps	0 B
Q4	B2	C4	8	512k	2M	509.1 kbps	72.7 KiB
Q5	B2	C5	8	512k	2M	512.1 kbps	72.7 KiB

Priority on Leaf Queue



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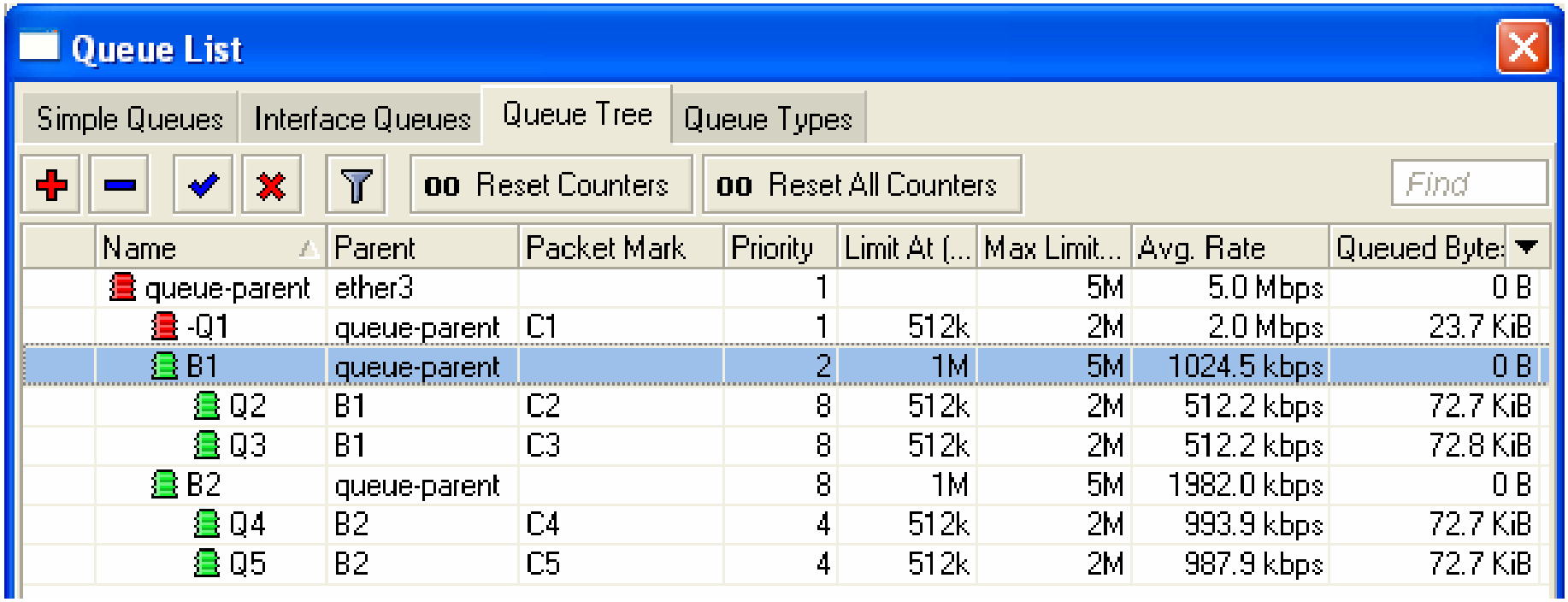
queue-parent	ether3		1		5M	5.0 Mbps	0 B
-Q1	queue-parent	C1	1	512k	2M	1981.2 kbps	71.3 KiB
B1	queue-parent		8	2M	5M	2.0 Mbps	0 B
Q2	B1	C2	8	512k	2M	999.9 kbps	72.7 KiB
Q3	B1	C3	8	512k	2M	1000.0 kbps	72.8 KiB
B2	queue-parent		8		5M	1024.4 kbps	0 B
Q4	B2	C4	2	512k	2M	512.2 kbps	72.7 KiB
Q5	B2	C5	2	512k	2M	512.1 kbps	72.7 KiB

Priority on Inner Queue



Name	Parent	Packet Mark	Priority	Limit At (...	Max Limit...	Avg. Rate	Queued Byte:
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-Q1	queue-parent	C1	1	512k	2M	2.0 Mbps	23.7 KiB
B1	queue-parent		2	1M	5M	1024.5 kbps	0 B
Q2	B1	C2	8	512k	2M	512.2 kbps	72.7 KiB
Q3	B1	C3	8	512k	2M	512.2 kbps	72.8 KiB
B2	queue-parent		8	1M	5M	1982.0 kbps	0 B
Q4	B2	C4	4	512k	2M	993.9 kbps	72.7 KiB
Q5	B2	C5	4	512k	2M	987.9 kbps	72.7 KiB

Priority works only on Leaf Queue, will not work on Inner Queue

Common Mistakes

- Leaf queue without parent
- Priority on Inner queue

Test case

- We have 300 hosts on our network
- In worst scenario, 200 hosts will online on the same time
- At least 20 hosts online at minimum.
- All hosts have same priority
- Total bandwidth = 10 Mbps

Tips

- For an office network that all computer have same speed and same priority:
  - Limit-at = Total bandwidth / max hosts
  - Max-limit = Total bandwidth / min hosts

- Max-limit = 10 mbps / 20 (min host)
  = 500 kbps
- Limit-at = 10 mbps / 200 (max host)
  = 50 kbps

More Detail Information

- http://wiki.mikrotik.com/wiki/HTB
- http://luxik.cdi.cz/~devik/qos/htb/

Thank you!

- Q&A……
- Or email to: valens@mikrotik.co.id