Real-Time BGP Data Access

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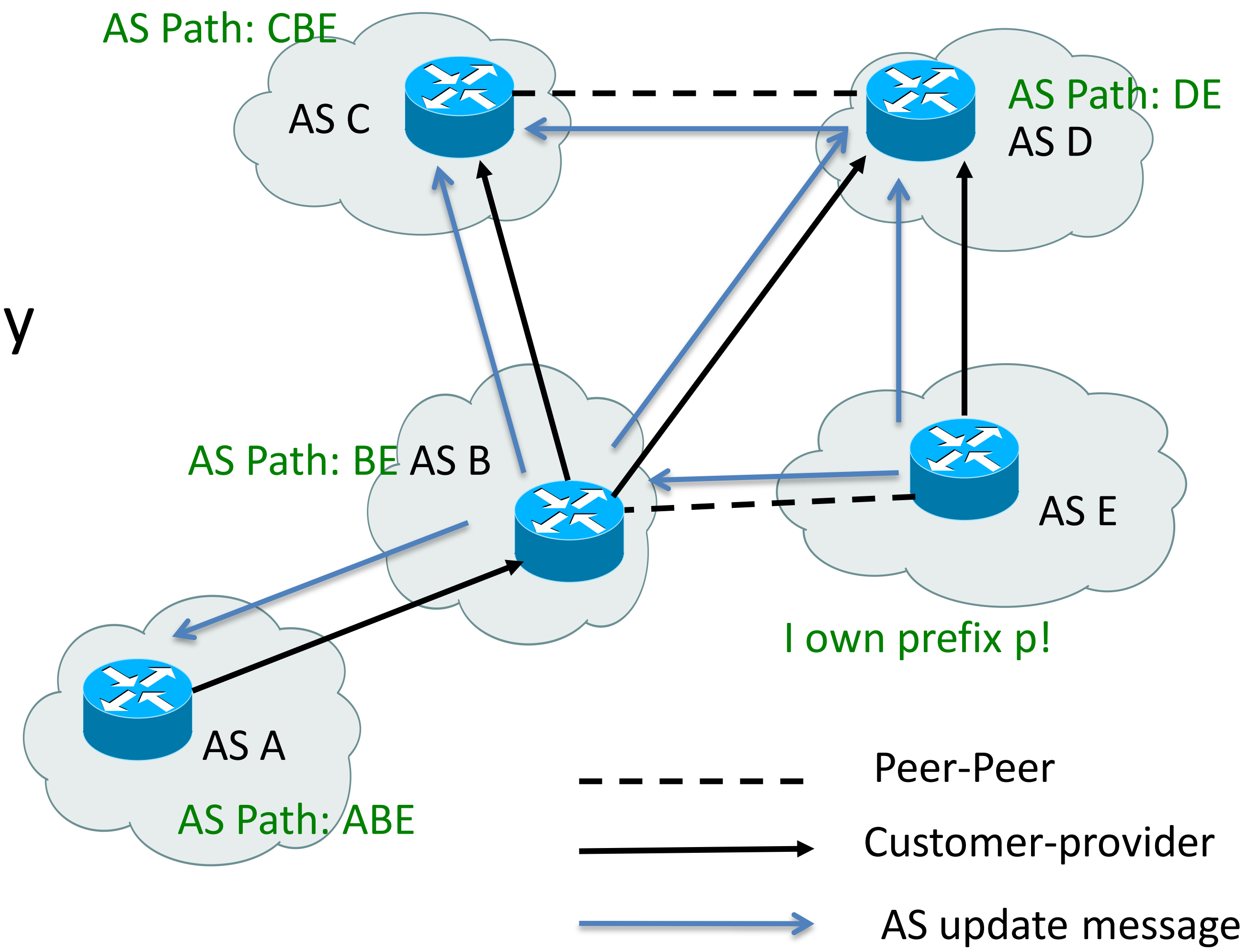
Introduction

- Real-Time BGP data
  - What is it and Do you really need it?
  - What can you do with it?
  - Where and how can you get it?
- Running your own BGP collector
  - BGPmon: real-time, scalable, extensible monitoring system
    - Software architecture and design
    - BGPmon at Colorado State University

Background

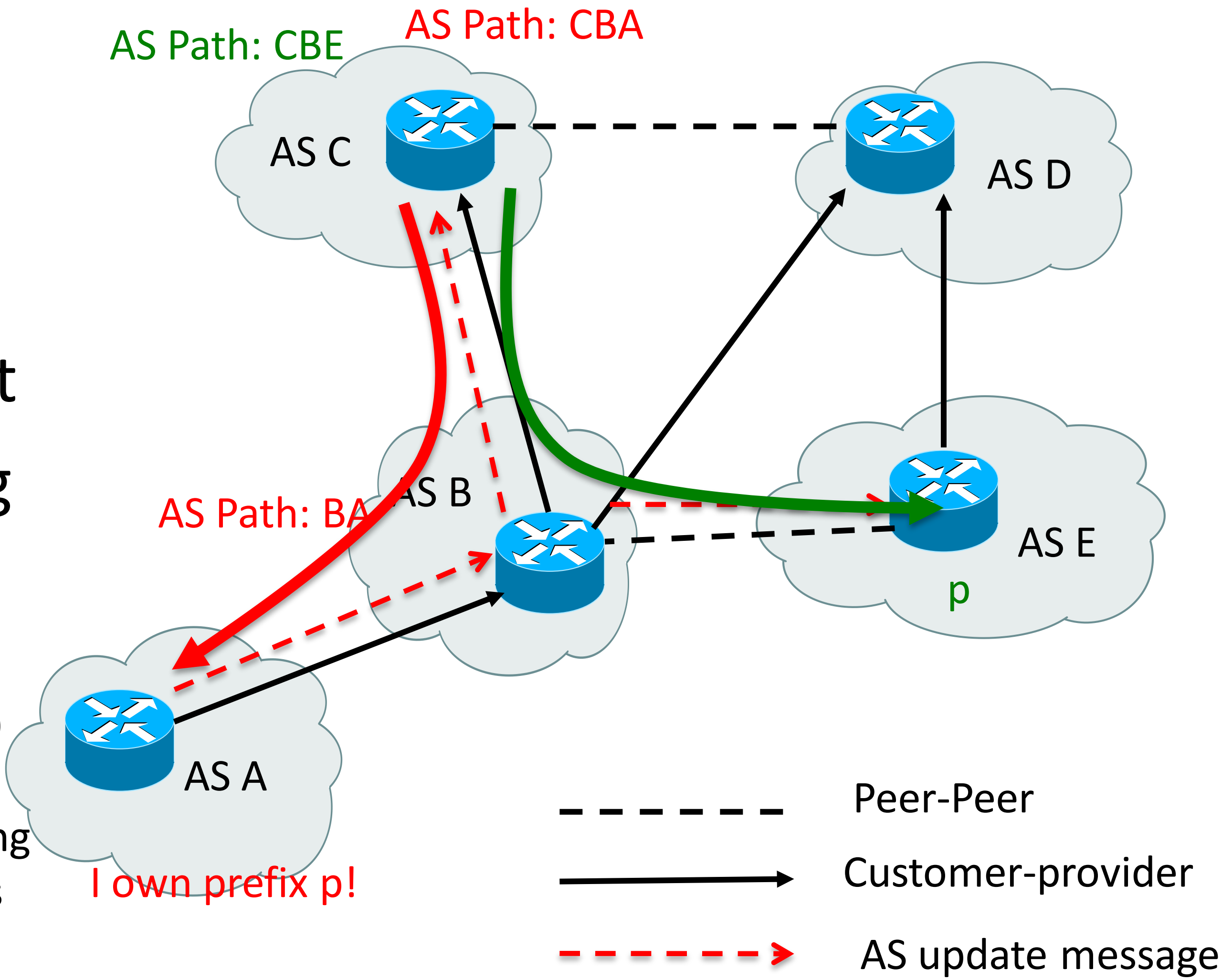
- Autonomous System (AS)
- Border Gateway Protocol (BGP)
- Profit-driven policy



Background (cont.)

- BGP lacks authentication
- Fabricated AS announcement
- Prefix hijacking

April 8, 2010: Chinese ISP hijacks the Internet: China Telecom originated 37,000 prefixes not belonging to them in 15 minutes, causing massive outage of services globally.



BGP Message Example

- “Bits off the wire” between two BGP speakers:
  - 4001010040020C020536D900D10D1C10866E0F400304C02BD98D18BD5533
    - Not easy to analyze. RFC 4271 has all details.
- How we can represent BGP message in human readable format?
  - Extensible Markup Language (XML)
    - Extensible and easy to use data format.
    - It is widely used for the representation of arbitrary data structures.
    - It is common for XML to be used in interchanging data over the Internet (RFC 3023).

XML-Based Format for Representing BGP Messages (XFB)

```
<ASCII_MSG>
        <LENGTH>53</LENGTH>
        <TYPE value="2">UPDATE</TYPE>
        <UPDATE>
                <ATTRIBUTE>
                        <LENGTH>12</LENGTH>
                        <TYPE value="2">AS_PATH</TYPE>
                        <AS_PATH>
                                <AS_SEG type="AS_SEQUENCE" length="5">
                                        <AS>14041</AS><AS>209</AS>  <AS>3356</AS>
                                        <AS>4230</AS><AS>28175</AS>
                                </AS_SEG>
                        </AS_PATH>
                </ATTRIBUTE>
                <ATTRIBUTE>
                        <LENGTH>4</LENGTH>
                        <TYPE value="3">NEXT_HOP</TYPE>
                        <NEXT_HOP>192.43.217.141</NEXT_HOP>
                </ATTRIBUTE>
                <NLRI count="1">
                        <PREFIX label="DPATH" afi="IPV4" afi_value="1" safi="UNICAST"
                                safi_value="1">189.85.51/24</PREFIX>
                </NLRI>
</UPDATE>
```

BGP message total length

BGP message type, according to RFC 4271

BGP AS Path data

Not difficult, right?

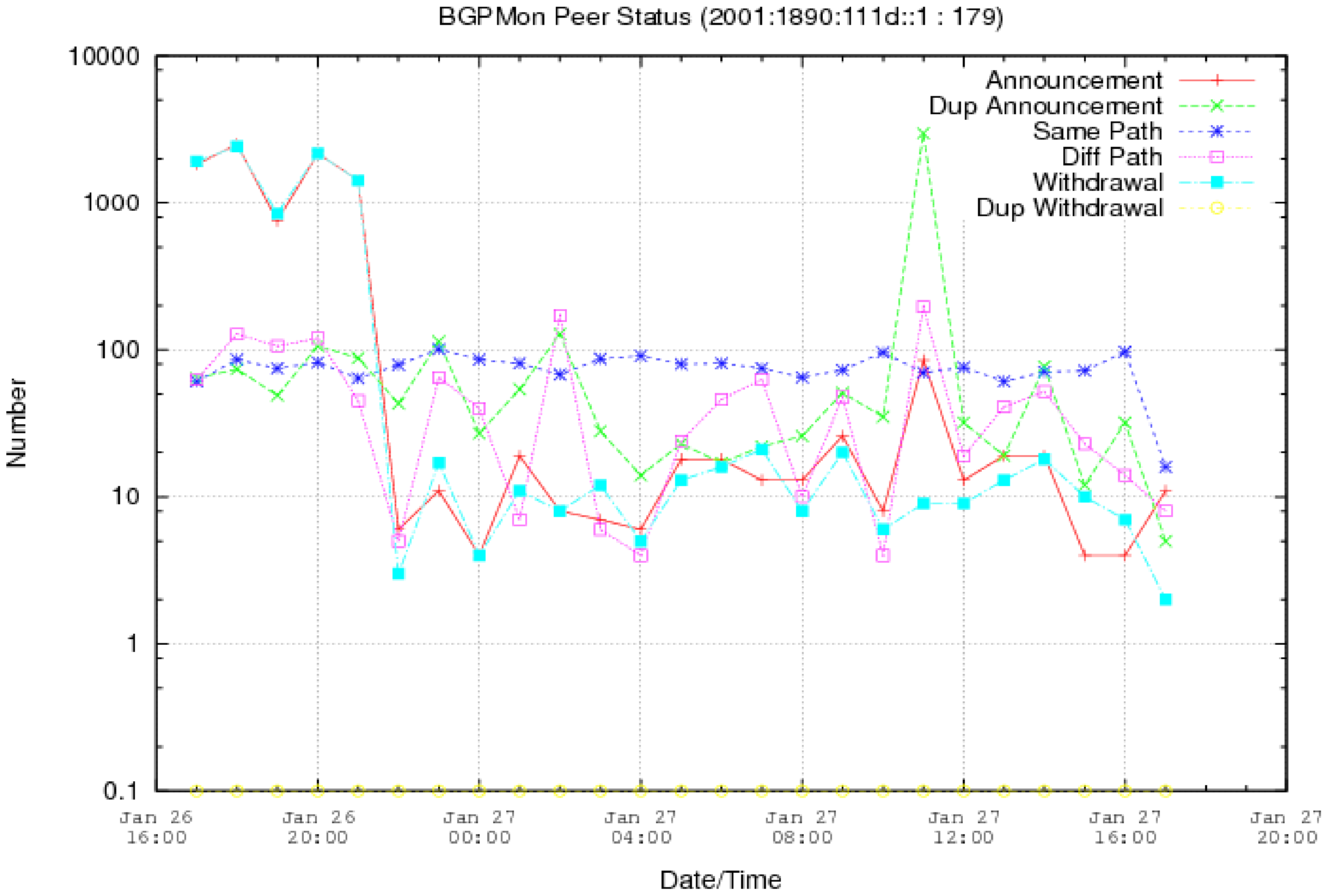
Next Hop data

Announced Prefix

Receiving Data in Real-time

- Service is available now!
  - BGP update messages are accessible within a **few** seconds
    - Open telnet session or establish TCP connection to livebgp.netsec.colostate.edu port 50001
  - Full BGP table snapshots are available every 2 hours
    - Open telnet session or establish TCP connection to livebgp.netsec.colostate.edu port 50002

Example of XML Data



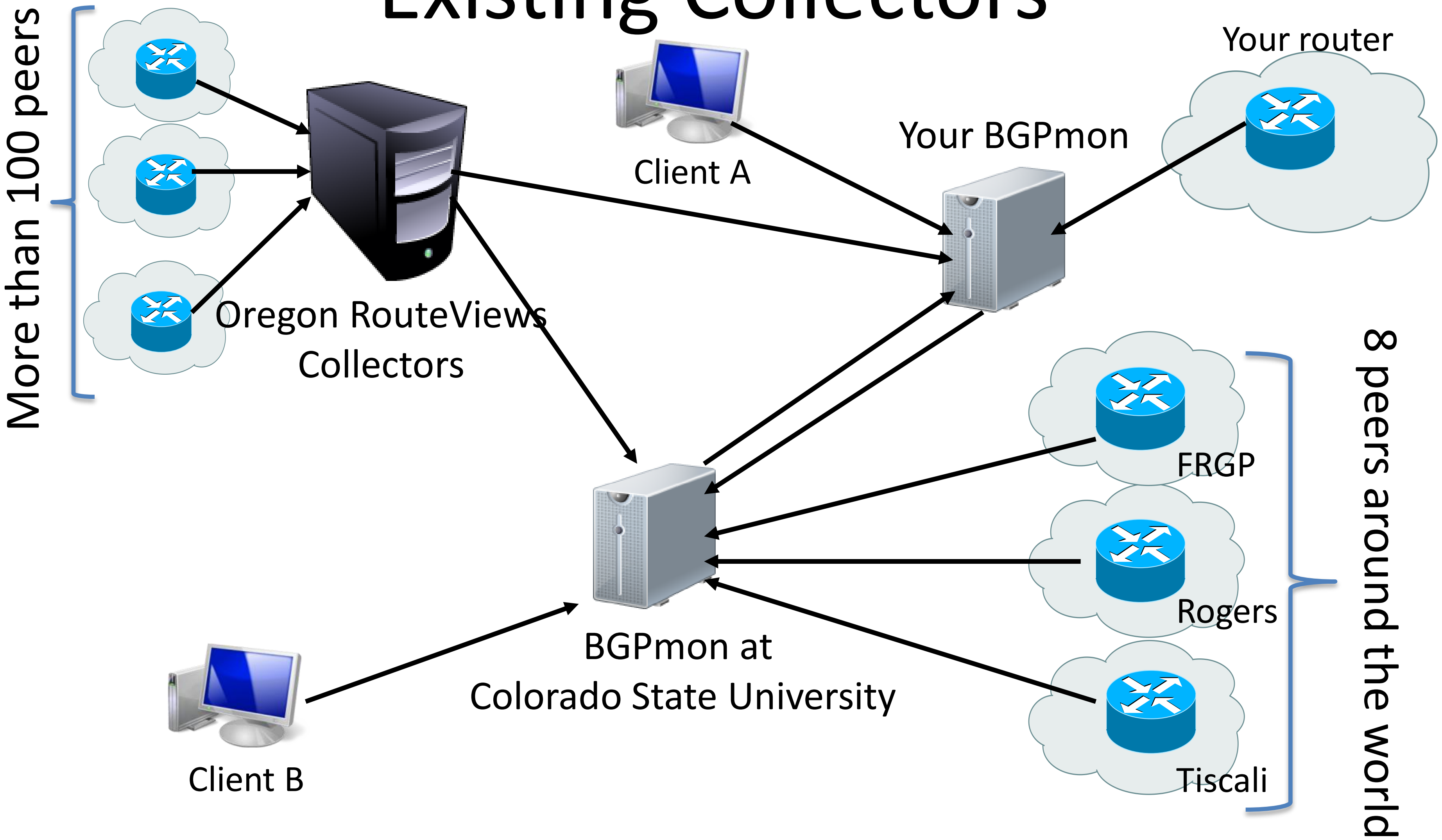
Running Your Own Collector

- In order to monitor your own BGP router and network prefixes, you should:
  - Download and install BGP Monitoring System (BGPmon)
  - Run usual *./configure && make && make install*
  - Create BGP peering session between router and BGPmon instance.
  - That's all! Real-time data is available at port 50001 and 50002 of your BGPmon.

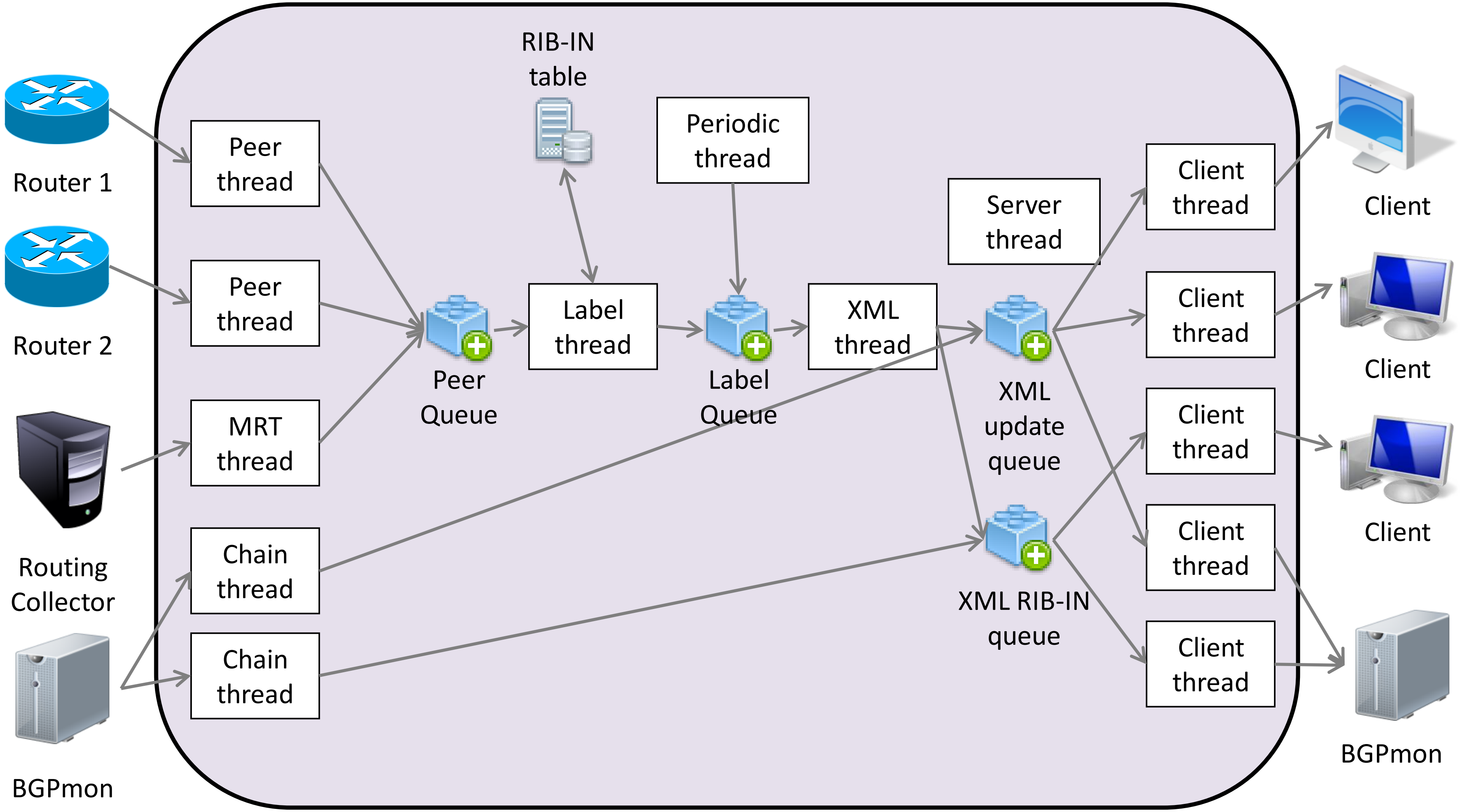
- Project Website

http://bgpmon.netsec.colostate.edu

Merging Your Collector with Existing Collectors



BGPmon Architecture



BGPmon features

- Open Source multi-threaded software
- Support IPv4 and IPv6
- Support 2-byte and 4-byte AS numbers
- Load balancing (Fast writers/Slow readers)
  - Queuing and Pacing Algorithms
- Backward-compatible with existing Routing Collectors via MRT format (draft-ietf-grow-mrt-13)
  - Quagga to BGPmon patch available from RouteViews

Conclusions

- BGPmon Provides Real-Time BGPdata in a scalable way.
  - Essential Data Necessary for BGP Analysis
  - Enables Wide Range of New Services
- BGPmon represents an important change in how BGP monitoring is accomplished in the Internet
- BGPmon makes it much simpler for researchers and operators to obtain BGP data.

Service is available now –
http://bgpmon.netsec.colostate.edu

Questions?

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