DISTRIBUTED FORWARD ERROR CORRECTION

Overcoming packet loss in the access layer

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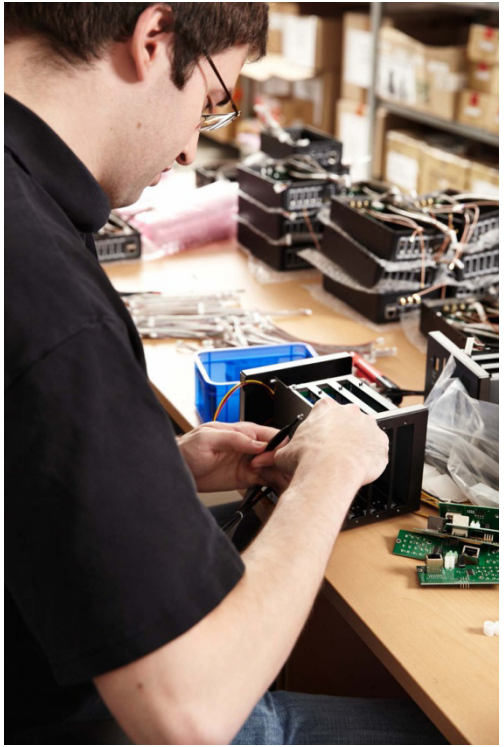
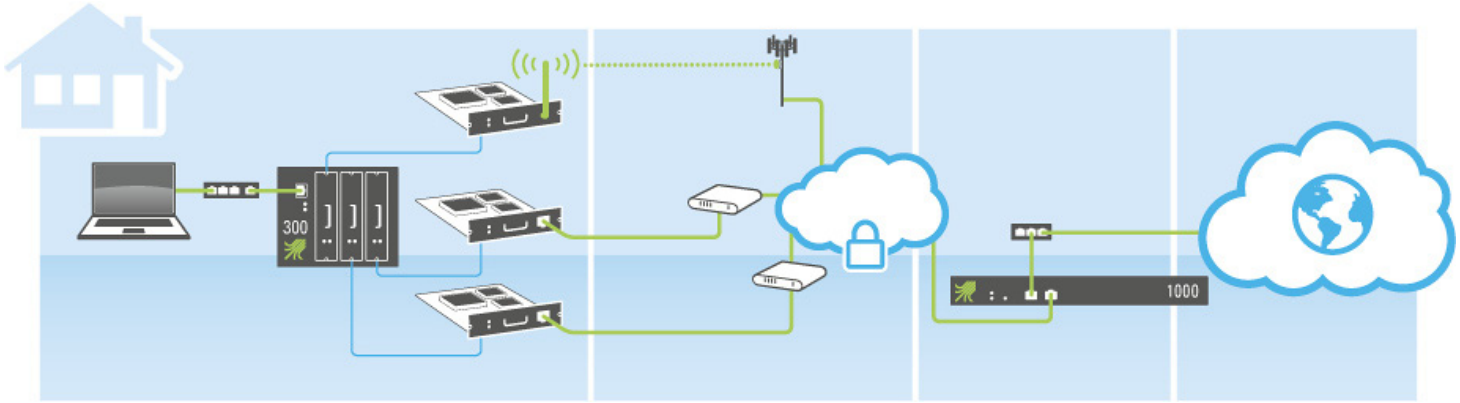
What Viprinet is about

- Viprinet produces specialized WAN bonding VPN routers, fully designed and manufactured in Germany
- Founded 2006 by Simon Kissel, market entry 2008
- Located in the Rhine valley near Frankfurt
- 40 employees, **we are hiring like mad**
- US and EU patent on WAN bonding
- World domination is near
- Took competition 6 years to do something similar



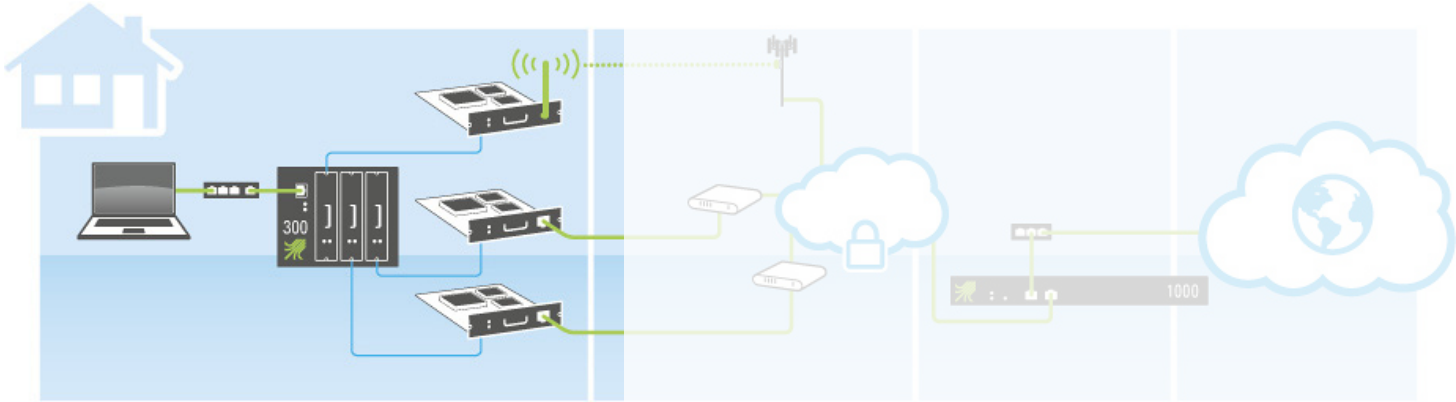
What is WAN bonding?

- 2+ broadband lines become 1 highly available joint line
- Real bonding with aggregated up- and downstream of all connections available
- Combination of all types of access media i.e. xDSL, 3G, 4G, or satellite



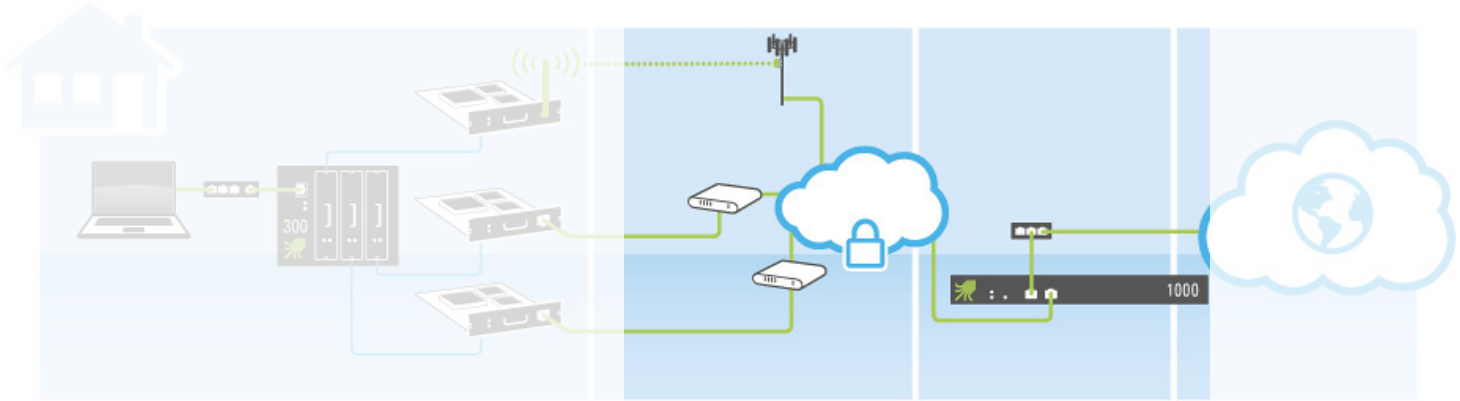
How does WAN bonding work?

- Encryption of data stream from the LAN by a Multichannel VPN Router and distribution onto the Internet connections
  (here: 2x DSL, 1x 3G / UMTS)



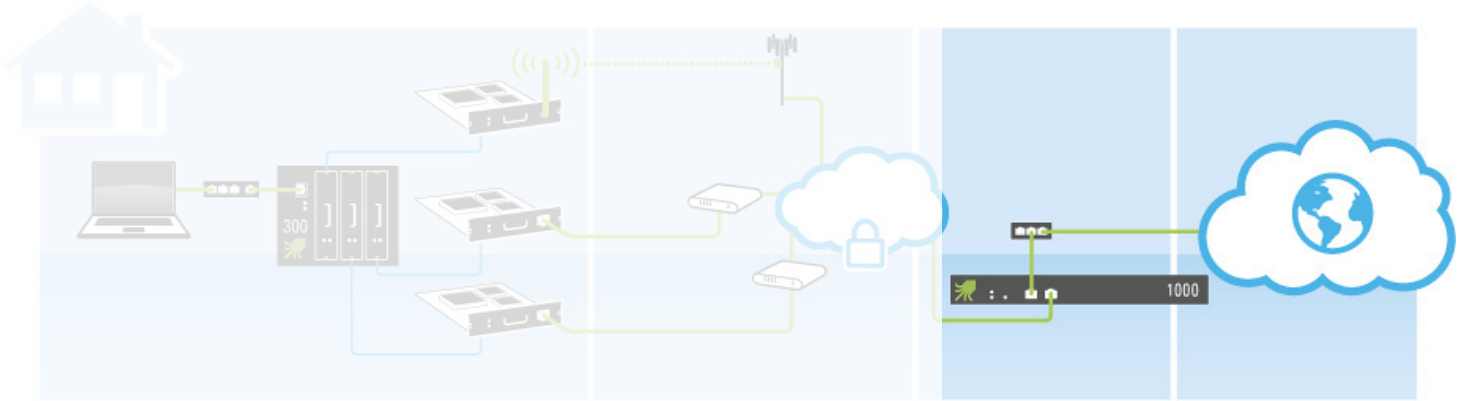
How does WAN bonding work?

- Encrypted and fragmented data passes networks of ISPs and reaches remote station (Hub)
- Data packets are unsorted, due to different latencies
- Hub sorts data packets, decrypts them, and reassembles data stream



How does WAN bonding work?

- Data stream is forwarded to actual destination on the Internet
- Same for opposite direction: Hub encrypts the data stream, while VPN Router decrypts it correctly



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When is this stuff used?

When is this stuff used?

- Whenever 98% or a lousy SLA aren't enough.
- Whenever Internet downtime means lots of money is lost or people die.
- When more bandwidth is needed, to replace expensive dedicated lines with cheap bonded broadband.
- Whenever people suddenly need Internet – or the Hotel WLAN sucks

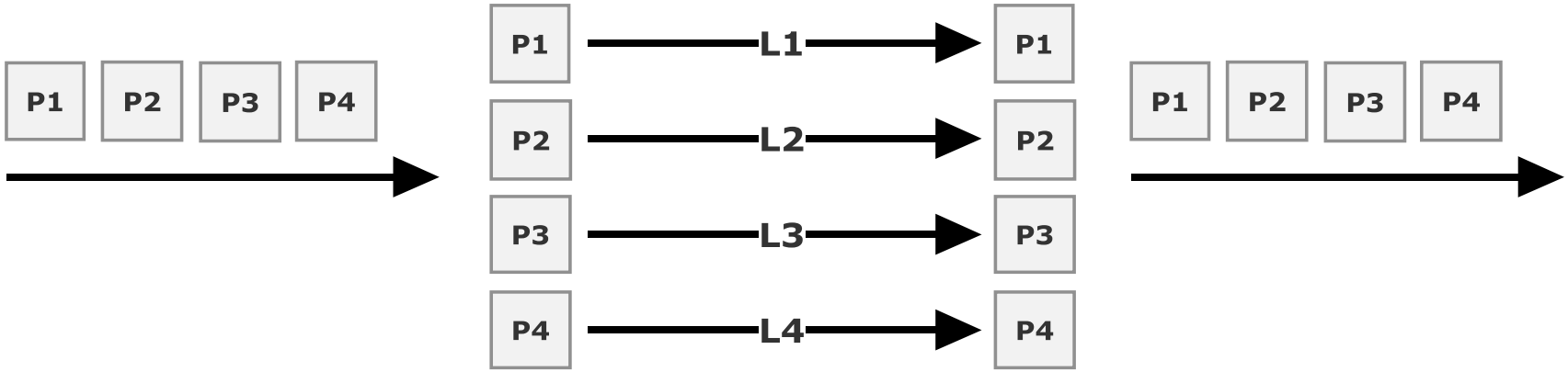
What is coming next – thoughts

- Packet loss, latency, and jitter are huge problems if you are using unreliable broadband.
- Bufferbloat is another problem. Fully utilize an LTE link on the downstream, and you'll end up with up to 1500ms of latency and interactive applications will starve.
- Typically, per-line Forward Error Correction is useless. FEC requires errors to be spread; however, in real life, packet loss comes in surges.
- But hey, if we bond different WAN media, their outages typically won't overlap much. Can we take advantage of that?

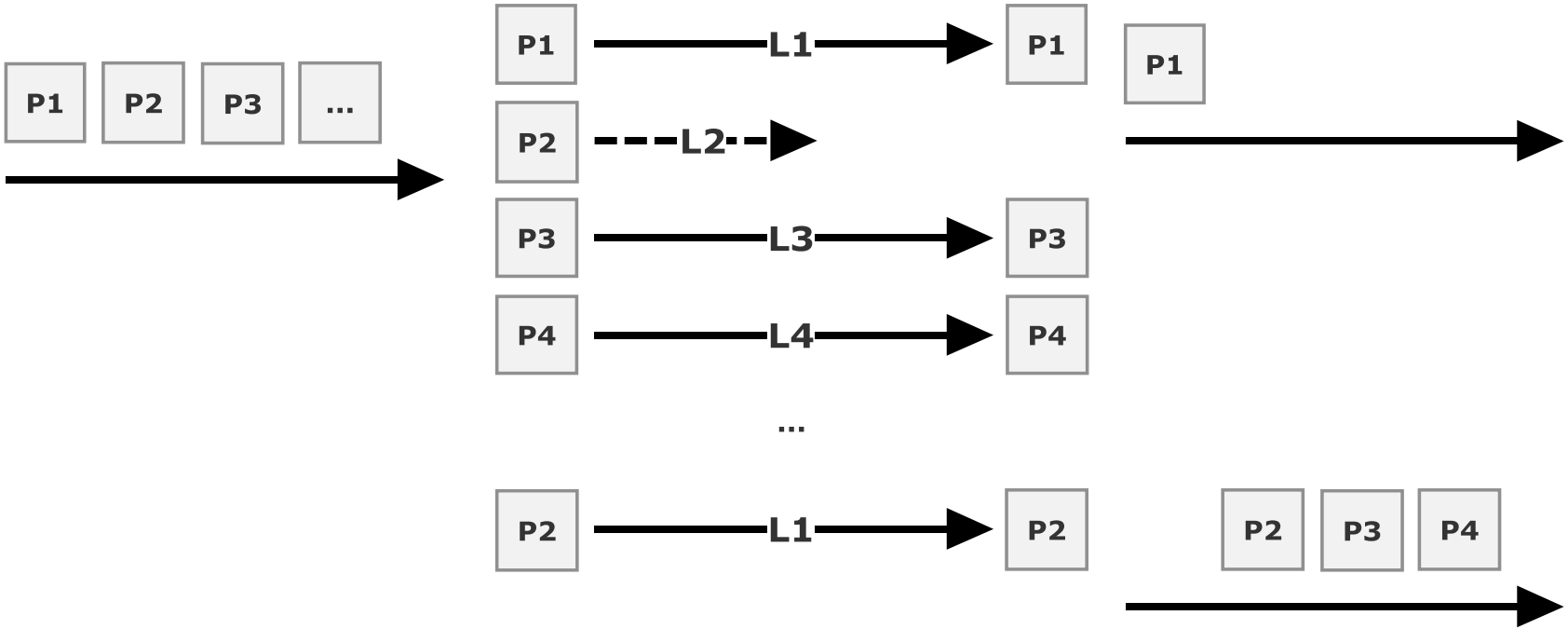
Distributed Forward Error Correction

- 0,0% packet loss when bonding crappy networks with high packet loss rate
- Low latency, low jitter
- Perfect for streaming, VoIP, and Internet in moving vehicles
- Patent pending
- High and stable throughput

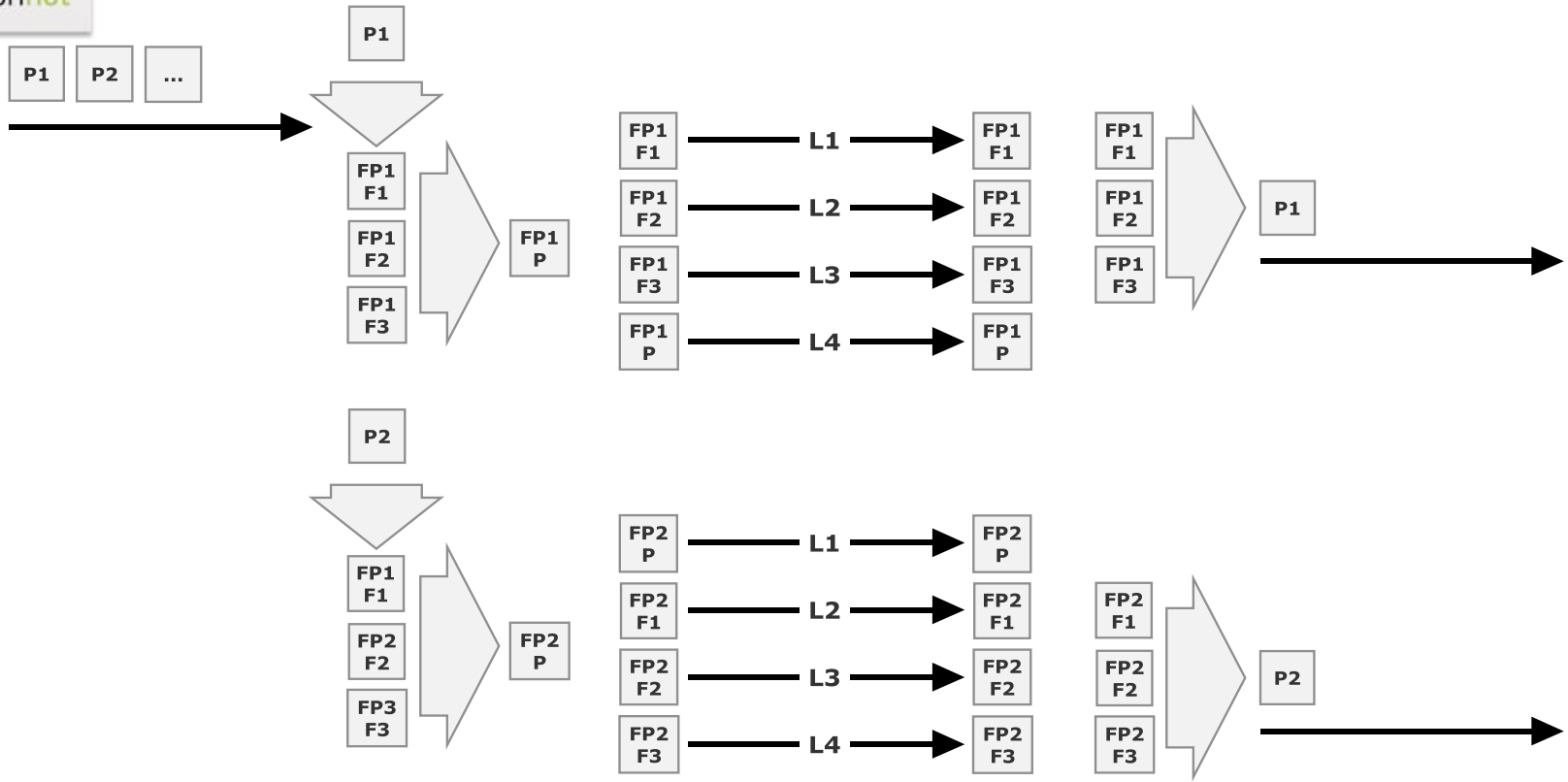
Classic Bonding Mode without packet loss



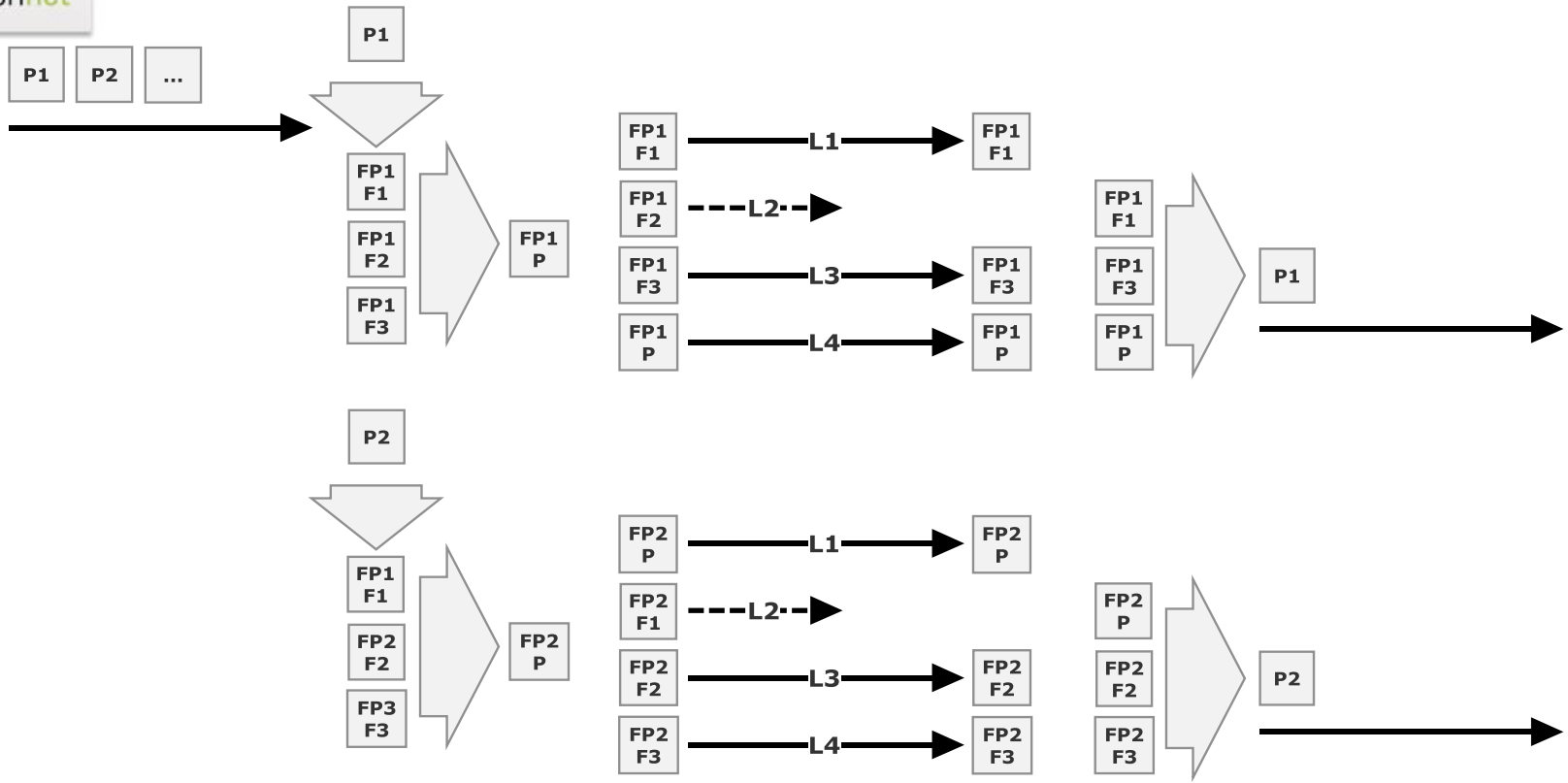
Classic Bonding Mode with packet loss



FEC Bonding Mode without packet loss



FEC Bonding Mode with packet loss



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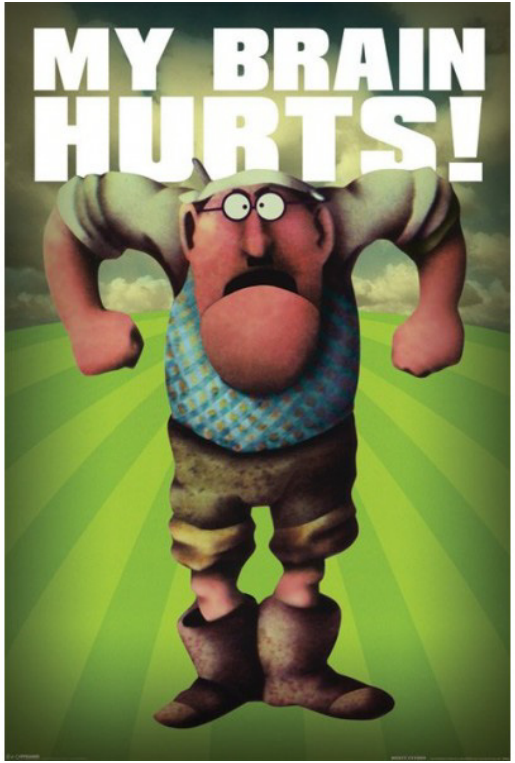
Distributed Forward Error Correction



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When?

- In beta now, available in Multichannel VPN Routers from January
- In future, this technology could be applied outside of the access layer.

  How about enforcing multiple different BGP paths between data centers, and then securing this link against any kind of packet loss or jitter using DFEC?

Thank you for your attention!