

Optimized, automated and protective: Shaping the future of networks

Christian Jacquenet

christian.jacquenet@orange.com

Agenda

- Optimize
- Automate
- Protect
- Collaborate?



13th IFIP Wireless and Mobile Networking Conference, Oct. 21-22, 2021, Montreal, Canada



Orange Expert
Future
networks

I have a dream.



Networks help optimizing service quality and continuity in an always-on, digitally inclusive communication world

- Advanced forwarding schemes for robust and scalable multi-service, context- and power-aware, privacy-friendly networking

Network automation at large is a reality

- From dynamic service parameter exposure and negotiation to service fulfillment and assurance

Networks can detect and anticipate attacks way before they reach their targets

- Introducing protective networking, on the road to collaborative networking

Optimize.



Orange Expert
Future
networks



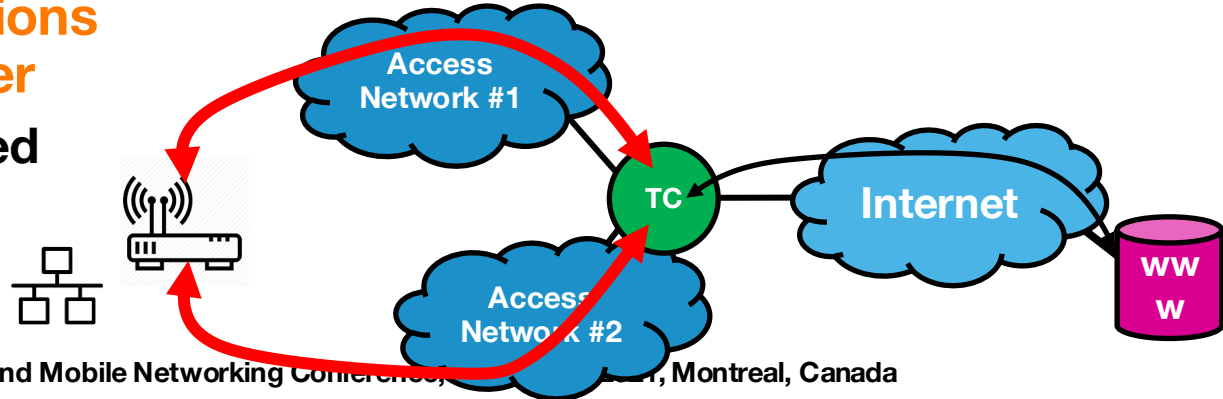
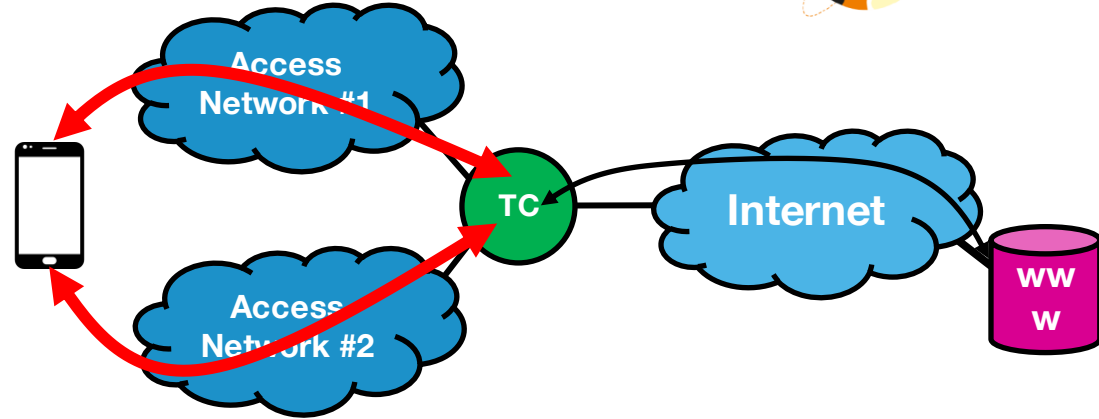
The network becomes a digital assistant

Multi-path forwarding schemes

- Thanks to the evolution of transport protocols (MPTCP, QUIC)

The network establishes multi-path communications on behalf of the end-user

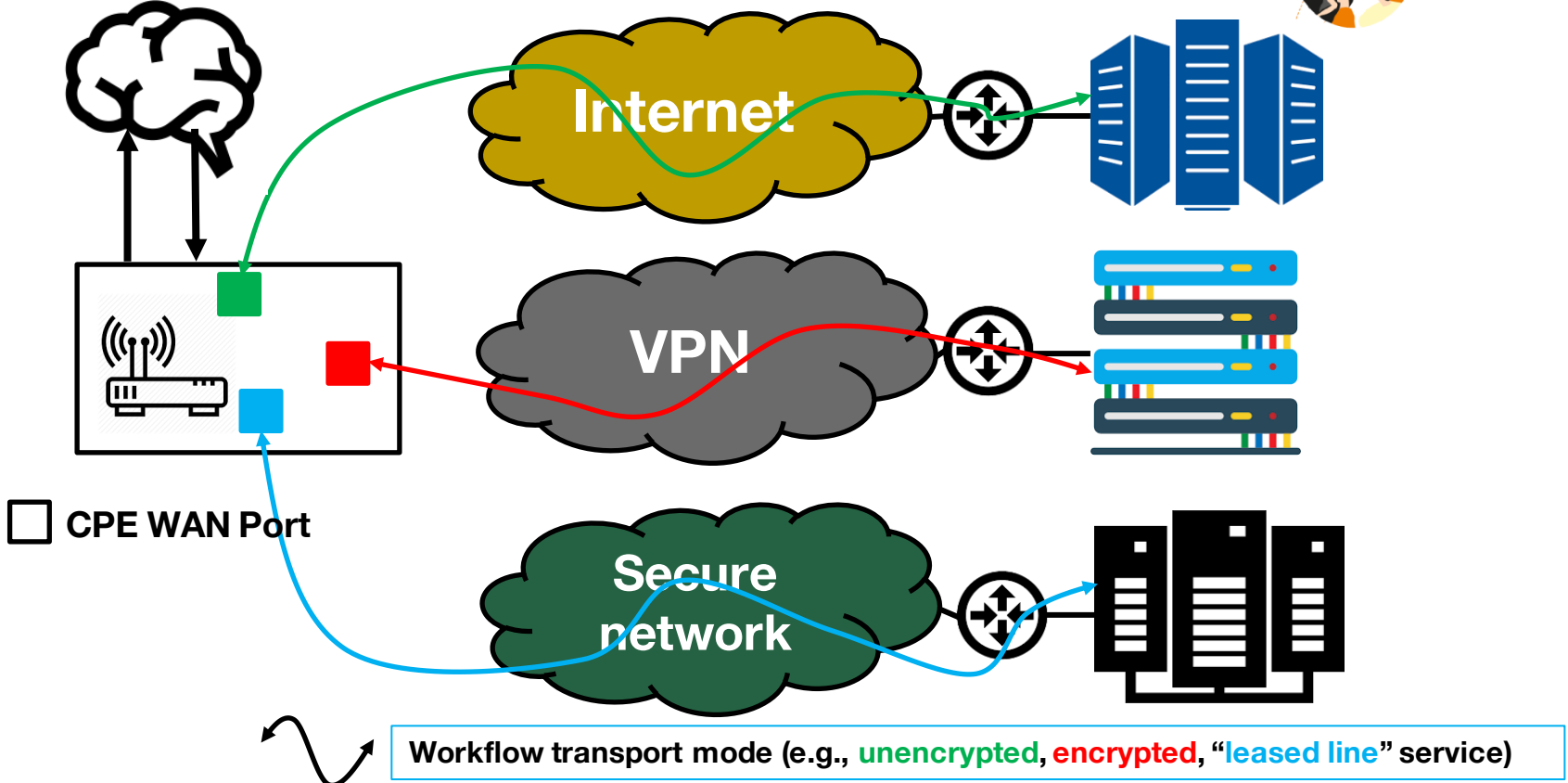
- Between multi-interfaced CPE/UE and Transport Converters (TC)



Cloud 9?



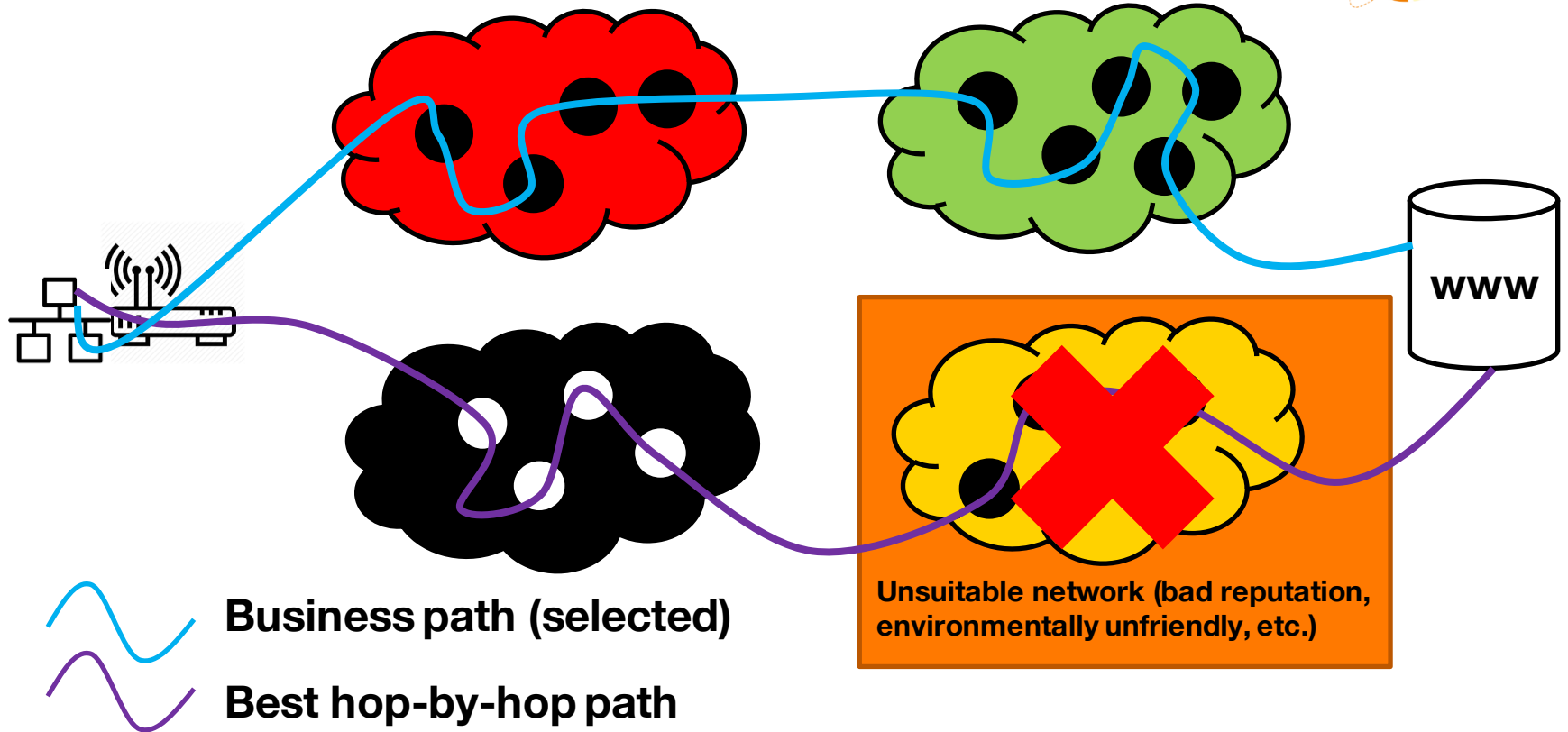
Orange Expert
Future
networks



A (green) business opportunity.



Orange Expert
Future
networks



Energy consumption matters.



Orange Expert
Future
networks

Telcos to play a key role in achieving some of UN's SDGs

- SDG#7 is one of them

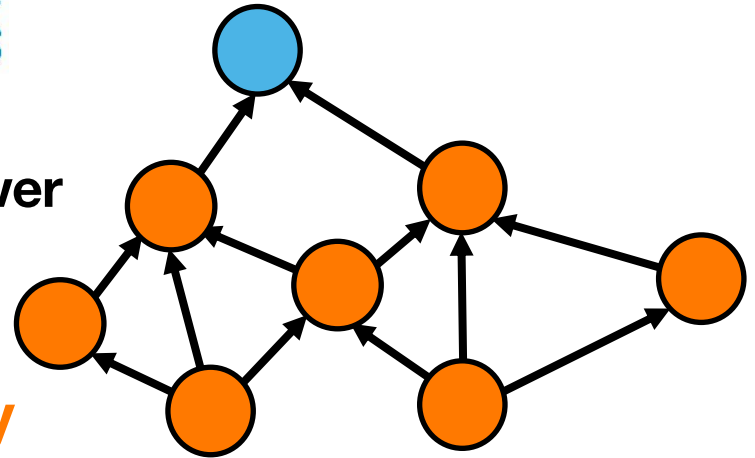


Energy-aware networking

- Advertise consumed and available power
- Compress data
- Optimize signaling

IPv6 IoT networking paved the way

- Energy-inferred multi-metric dynamic route computation



Automate.



Orange Expert
Future
networks

Seriously?



Orange Expert
Future
networks

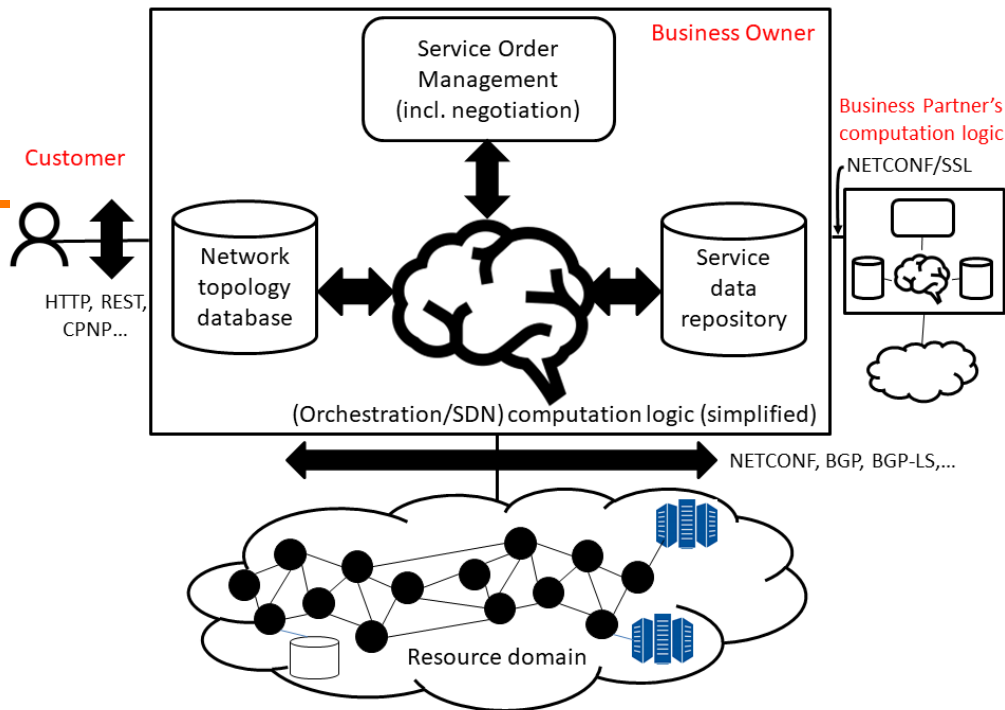


Welcome to the real world.

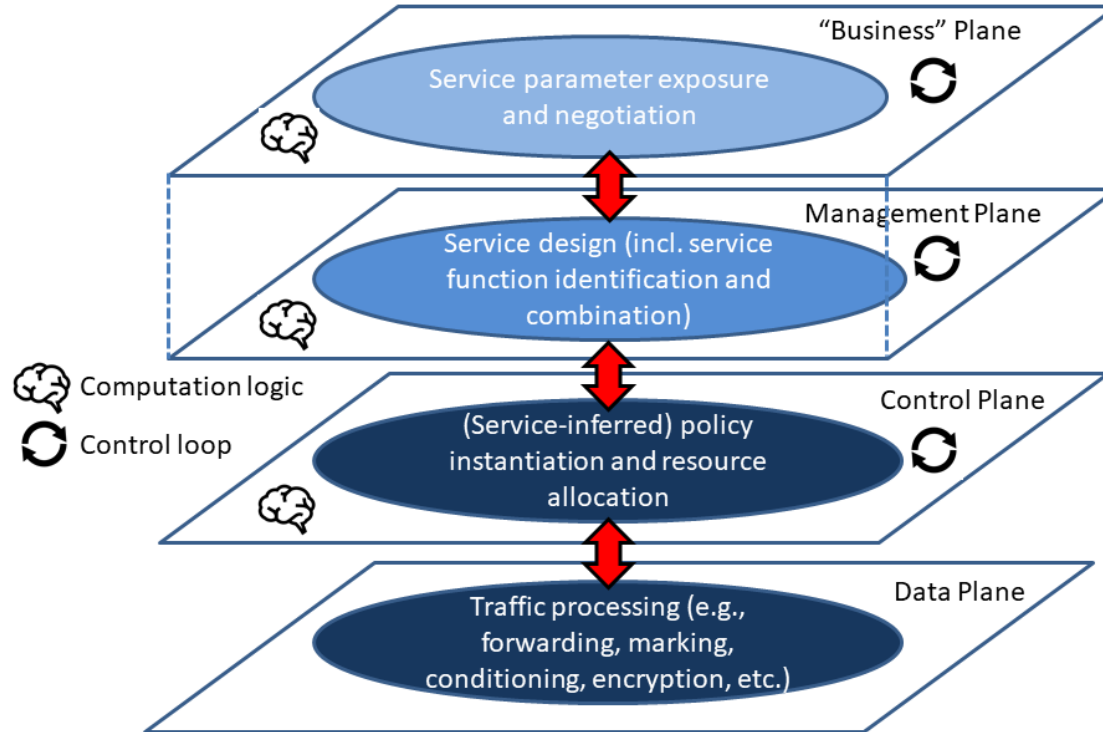


Orange Expert
Future
networks

Lots of declarative tasks
Vendor-agnostic
framework remains a nice-
to-have
Automation remains
embryonic



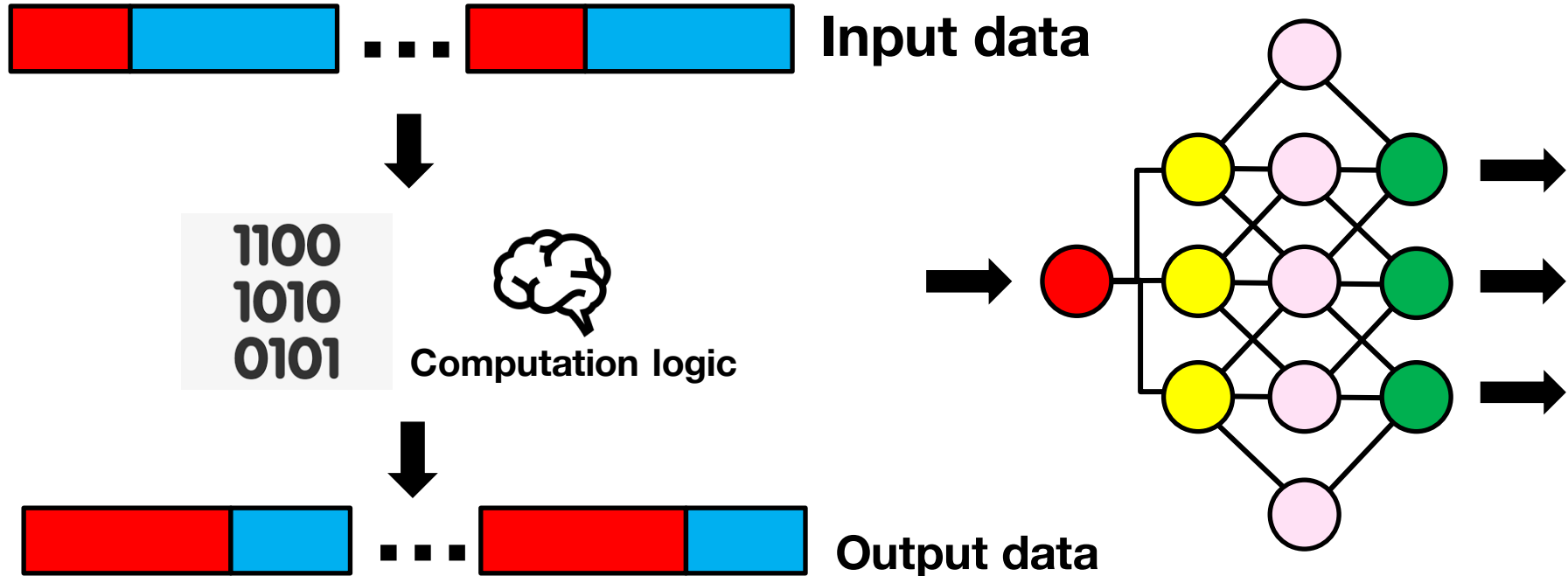
At last?



Acquire, learn and compute.



Orange Expert
Future
networks



A bit of advice.



Think global but keep control, always.

- Control loops and feedback mechanisms are instrumental for proper operation

Be open but preserve savoir-faire.

- Standard protocols and data models keep vendor lock-in away
- Open source should foster research, not hinder it

AI can help but demands extreme caution.

- From intent interpretation to deterministic decision-making process
- Service-inferred scalability and privacy preservation issues (to name a few)

Fill the gaps but be pragmatic.

- No one-size-fits-all solution

Protect.



Orange Expert
Future
networks

Detect, signal and mitigate.

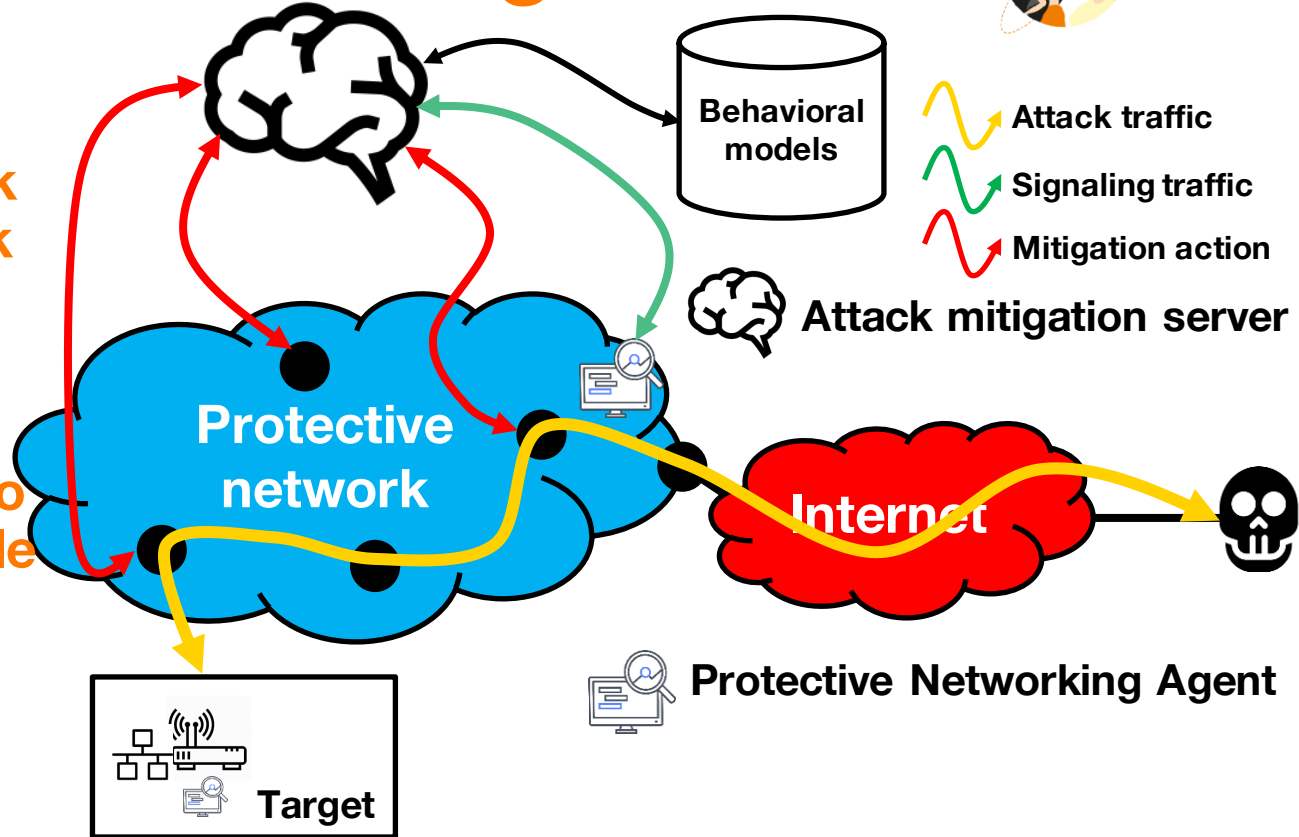


Orange Expert
Future
networks

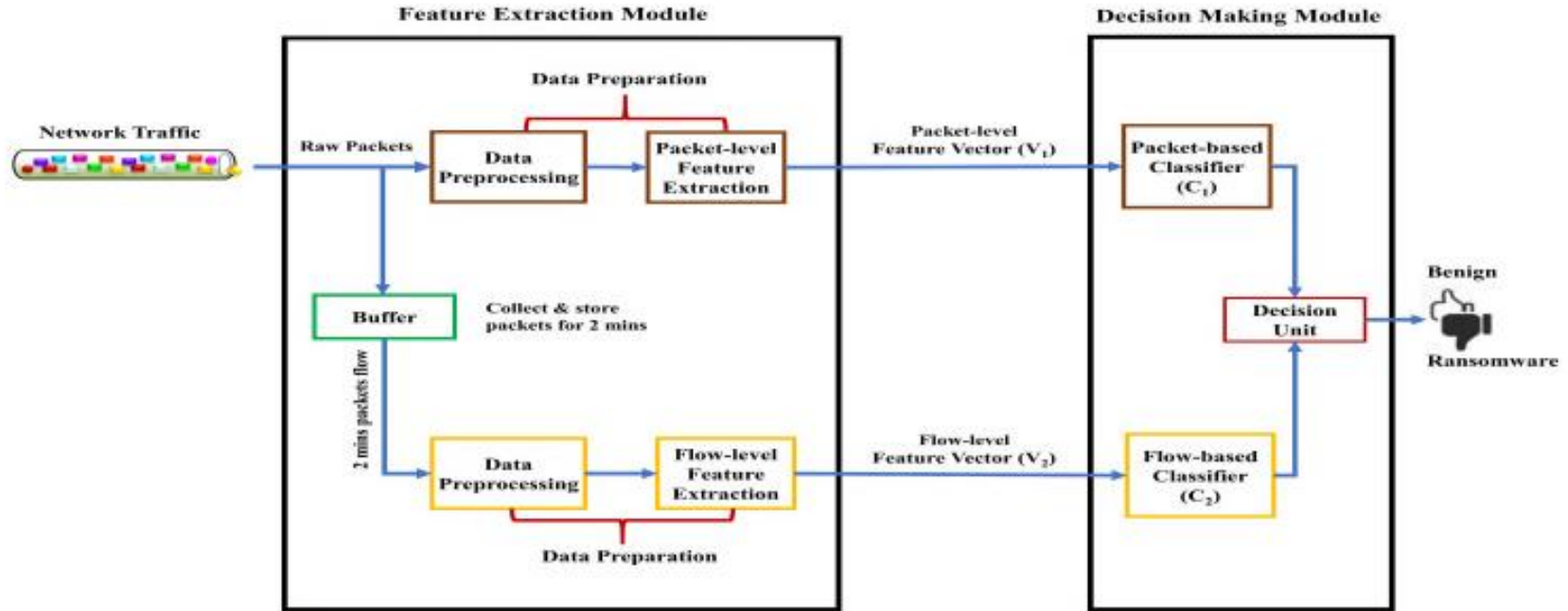
An anticipative attack mitigation framework

- Whatever the nature of the attack

Mitigation is performed as close to the source as possible



And then some.

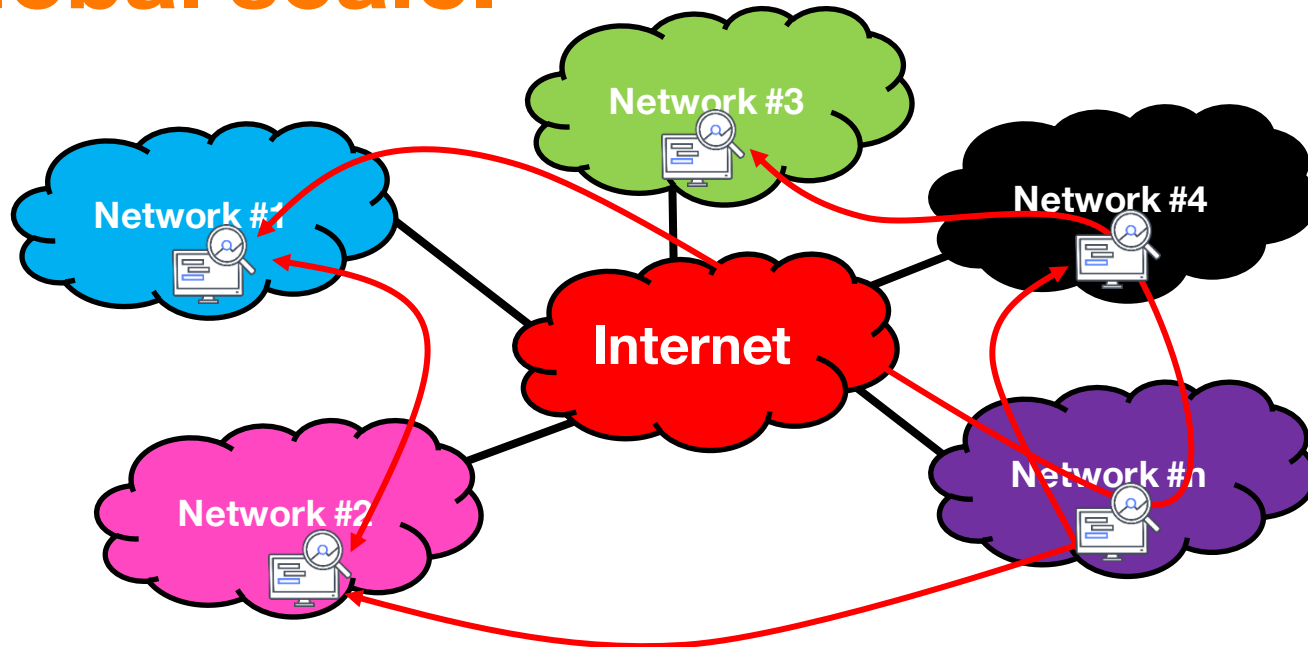


Source: A. O. Almashhadani et al., "[Multi-Class Classifier Network-Based Cryptocurrency Ransomware Detection System](#)", IEEE Access, Vol. 7, April 2019

Assist, exchange and mitigate at a global scale.



Orange Expert
Future
networks



Protective Networking Agent

Collaborate?



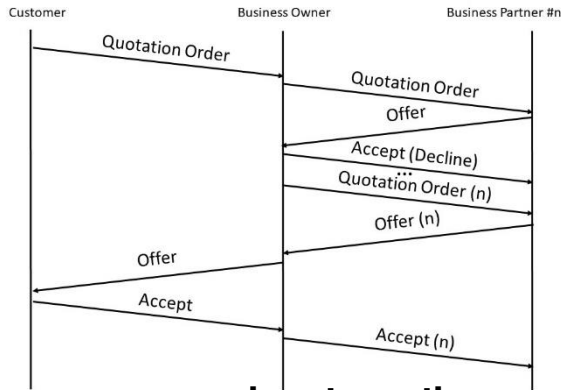
Orange Expert
Future
networks

Towards automated multi-domain service production?



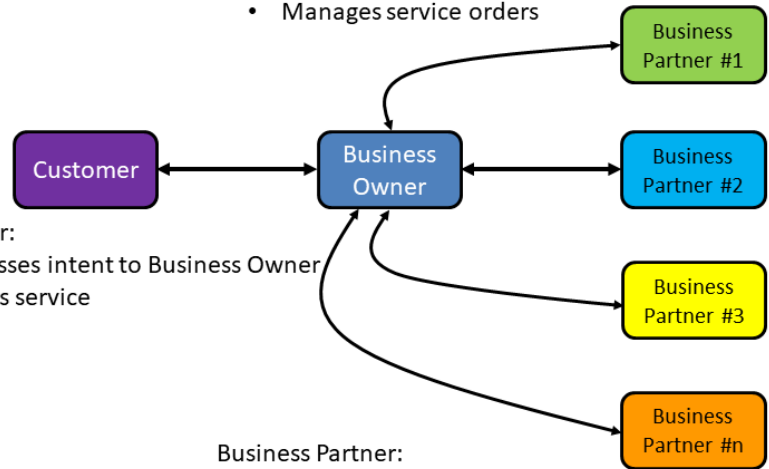
A three-step approach

1. Business owner identifies possible partners according to customer's intent
2. Negotiation cycles are dynamically triggered



Customer:

- Expresses intent to Business Owner
- Orders service



Business Owner:

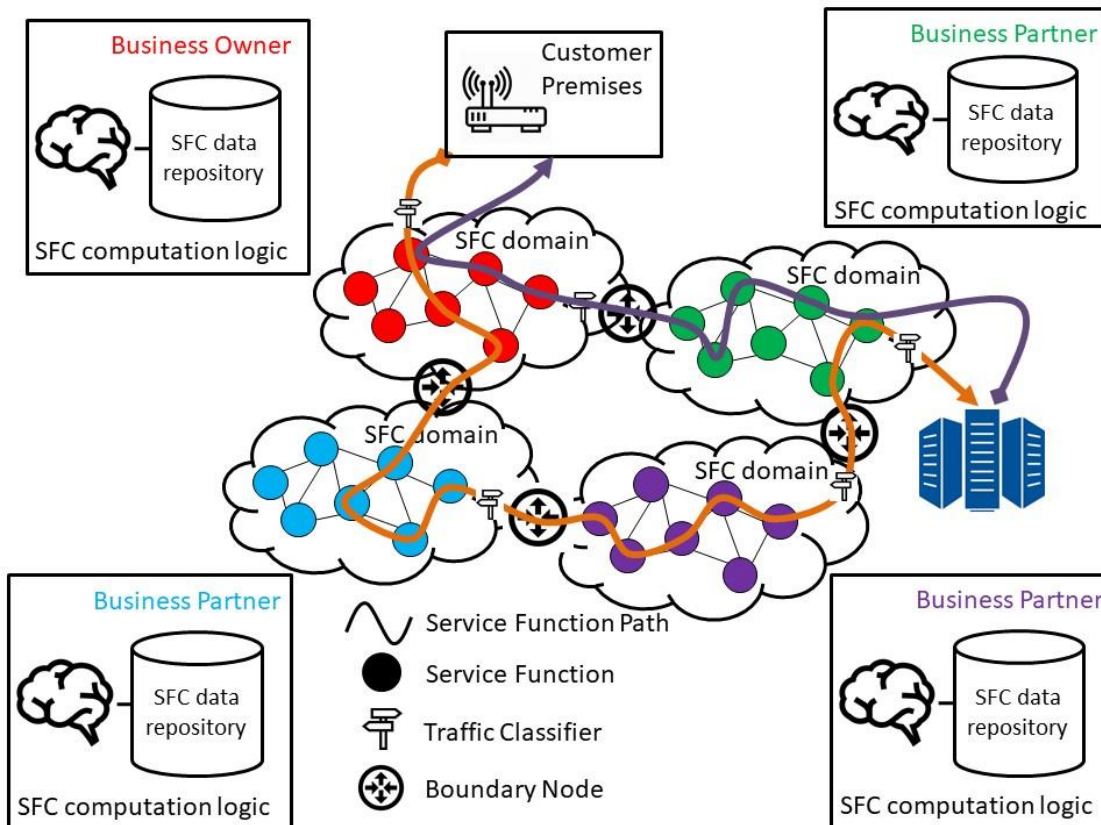
- Expresses intent towards Business Partners
- Accepts (declines) offers from Business Partners
- Makes an offer to customer
- Manages service orders

Business Partner:

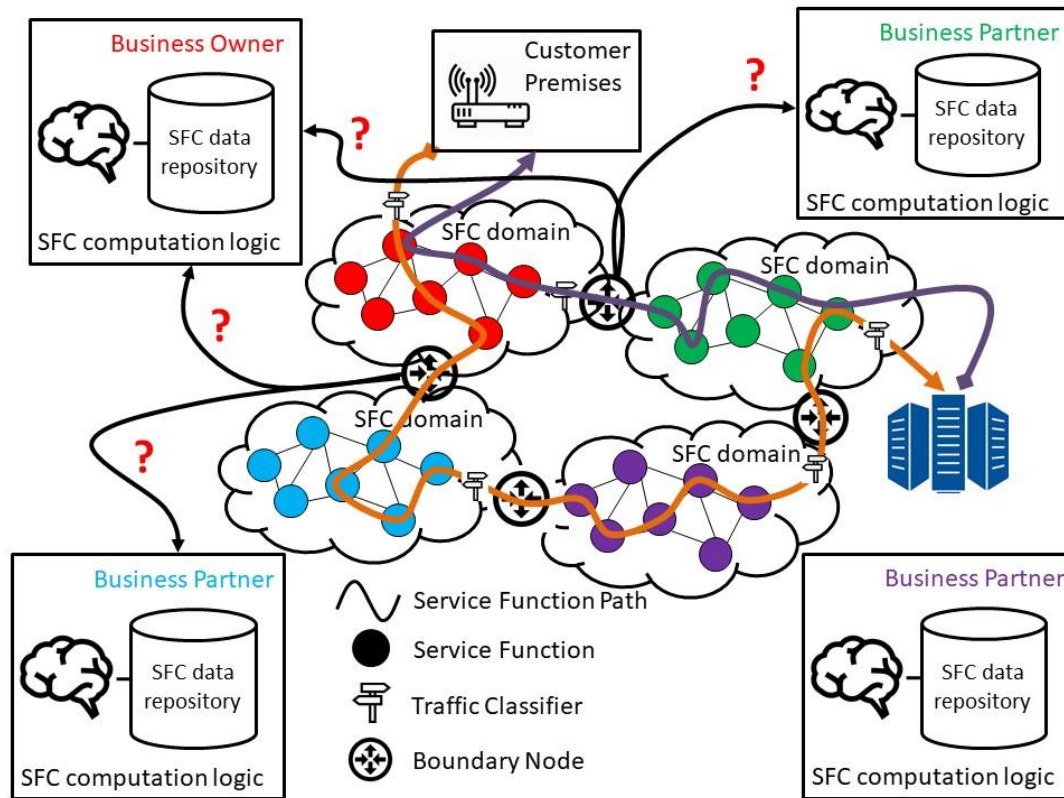
- Makes an offer to Business Owner(s)
- Allocates resources as contribution to the service

3. Business owner and partners then proceed with resource allocation assuming successful negotiation

Truly end-to-end?



This is challenging.



This is even more challenging.



Orange Expert
Future
networks

How to identify the most relevant partners?

How can a trust model be enforced, where all interested parties can safely collaborate to deliver the service (slice)?

What information needs to be exchanged between partners to deliver and operate the service (slice)?

What are the boundaries in terms of respective responsibility?

What guarantees can be provided?

Thank You!



13th IFIP Wireless and Mobile Networking Conference, Oct. 21-22, 2021, Montreal, Canada



Orange Expert
Future
networks