Dynam-IX:
a Dynamic Interconnection eXchange

website: https://dynam-ix.github.io

European Peering Forum

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Internet eXchange Points have been used to improve wide-area traffic delivery performance as they offer rich path diversity…

… but interconnecting is mostly a manual and lengthy process heavily influenced by personal relationships and brand image

Finding partner → Discussing properties → Formalizing terms → Deploying

Missed interconnection opportunities

Inefficient utilization of peering ports

Unoptimized traffic delivery

Operators' perceptions on reducing interconnection time [survey]

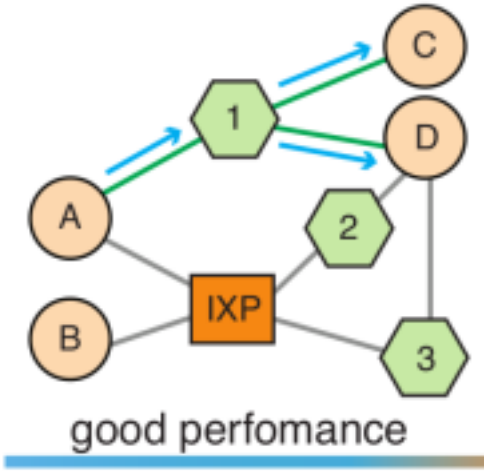
	😀	☺	😐
Responsiveness to traffic dynamics -	37%	14%	49%
Increasing peering port utilization -	60%	22%	18%
New economic opportunities -	56%	22%	22%
On-demand network services -	42%	17%	41%

Confidentiality! "I am not willing to disclose my business policy to other networks"

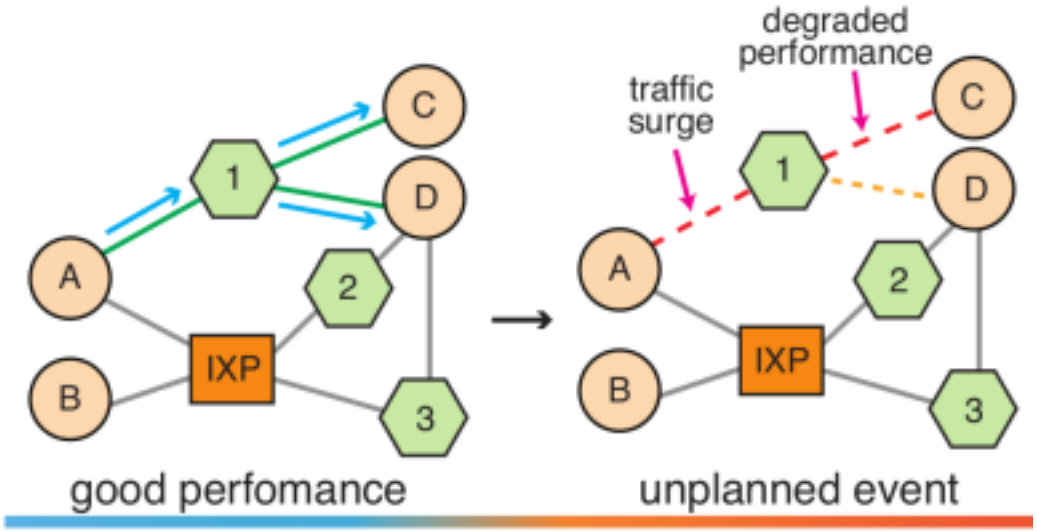
Independence! "I do not want to depend on a middleman to establish my interconnection agreements"

Stability! "What about Internet routing stability?"

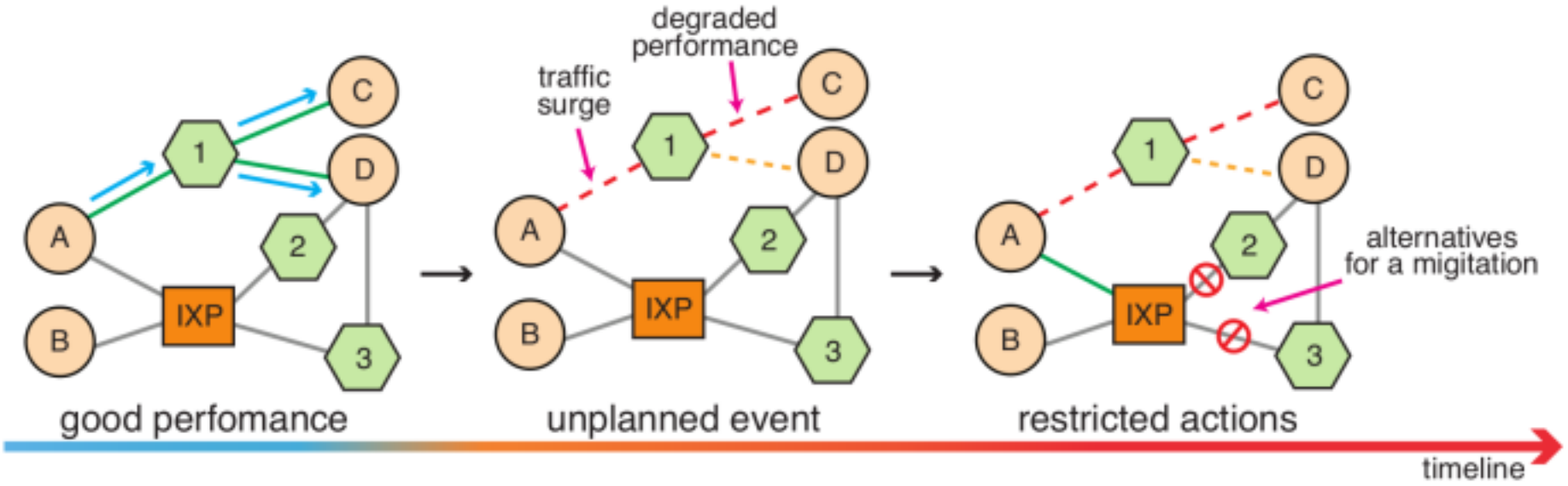
Example



Example


degraded
performance
traffic
surge
C
D
1
2
A
B
IXP
3
good perfomance
unplanned event

Example


A
B
C
D
1
2
3
IXP
traffic surge
degraded performance
alternatives for a migitation
good perfomance
unplanned event
restricted actions
timeline

Unleashing IXPs large unexplored potential to improve wide-area traffic delivery performance requires

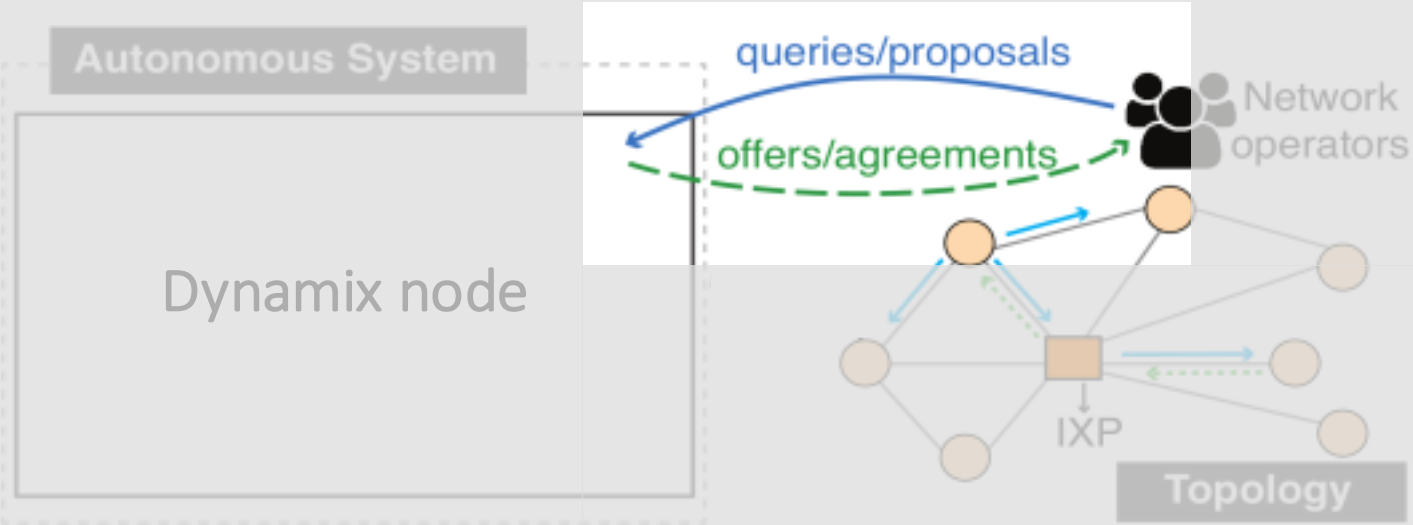
Structured process

Expressive interface

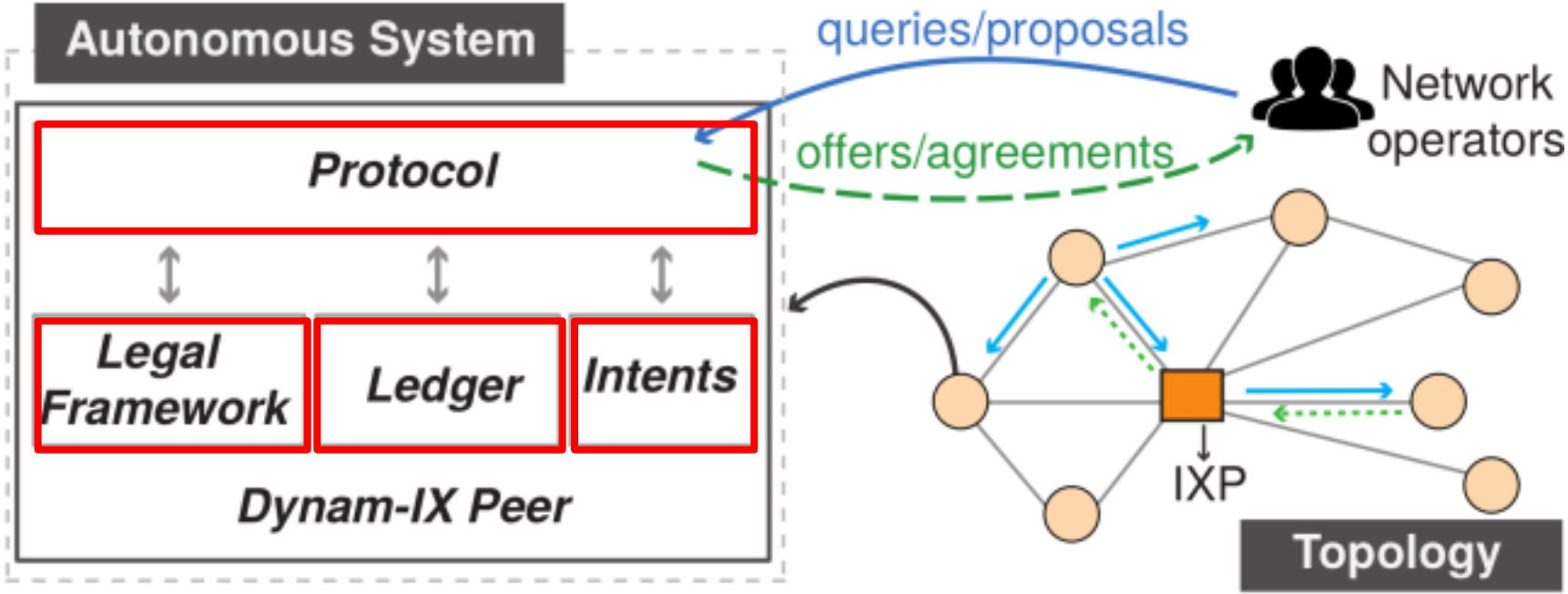
Mechanism to build trust

Privacy

Dynam-IX:
a negotiation protocol to facilitate interconnection



Dynam-IX is a framework to allow operators to improve wide-area traffic delivery performance by exploiting the rich connectivity of IXPs quickly



Preliminary evaluation

HYPERLEDGER
FABRIC

How long does it take to establish an interconnection agreement?

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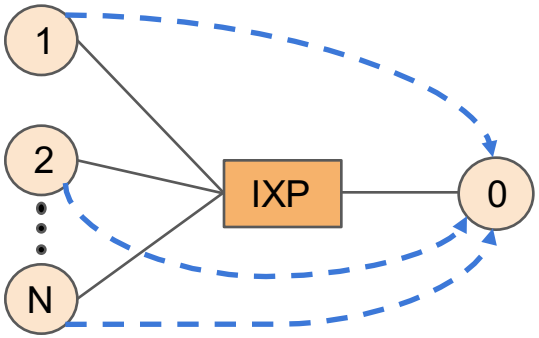
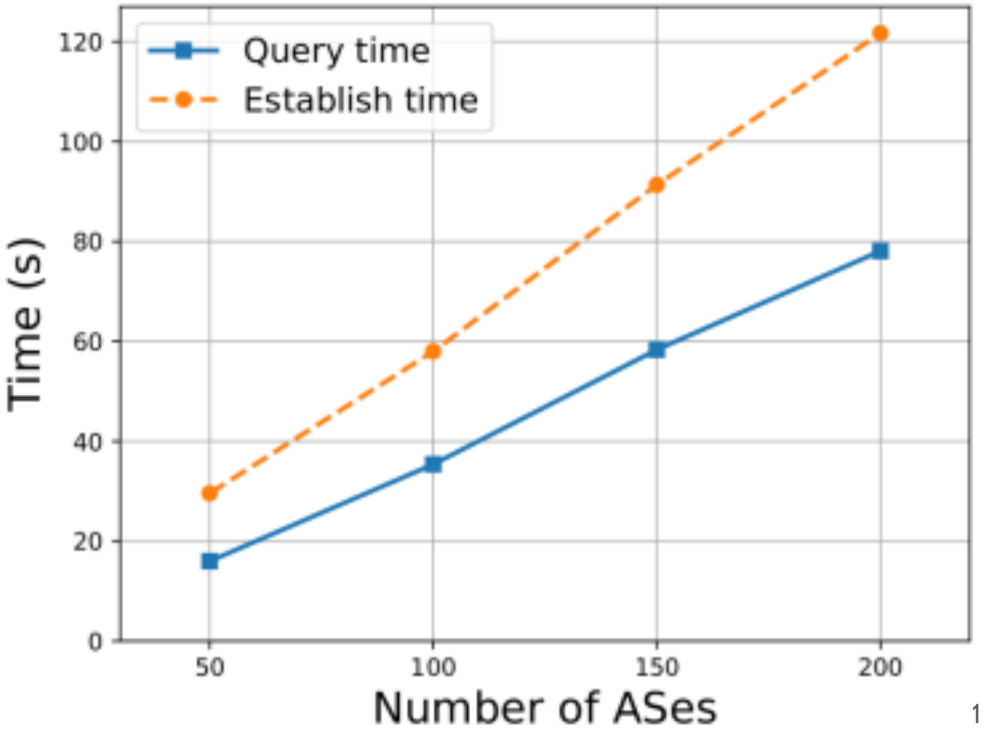


Goodput = 2.4 (50 ASes) and 1.4 (200 ASes)
Single AS can establish 80+ agreements in 60s

Regular conditions: interconnection agreements are established in less than 10 seconds



Summary and Future Work

Dynam-IX unleashes IXPs large unexplored potential to improve wide-area traffic delivery performance while keeping the privacy of peering policies

Enhance responsiveness

Increase port utilization

New economic opportunities

Evaluate the impacts in terms of *storage* and *bandwidth* requirements

Partnering with a global peering infrastructure to deploy Dynam-IX

Thank you!

More information available at:
https://dynam-ix.github.io

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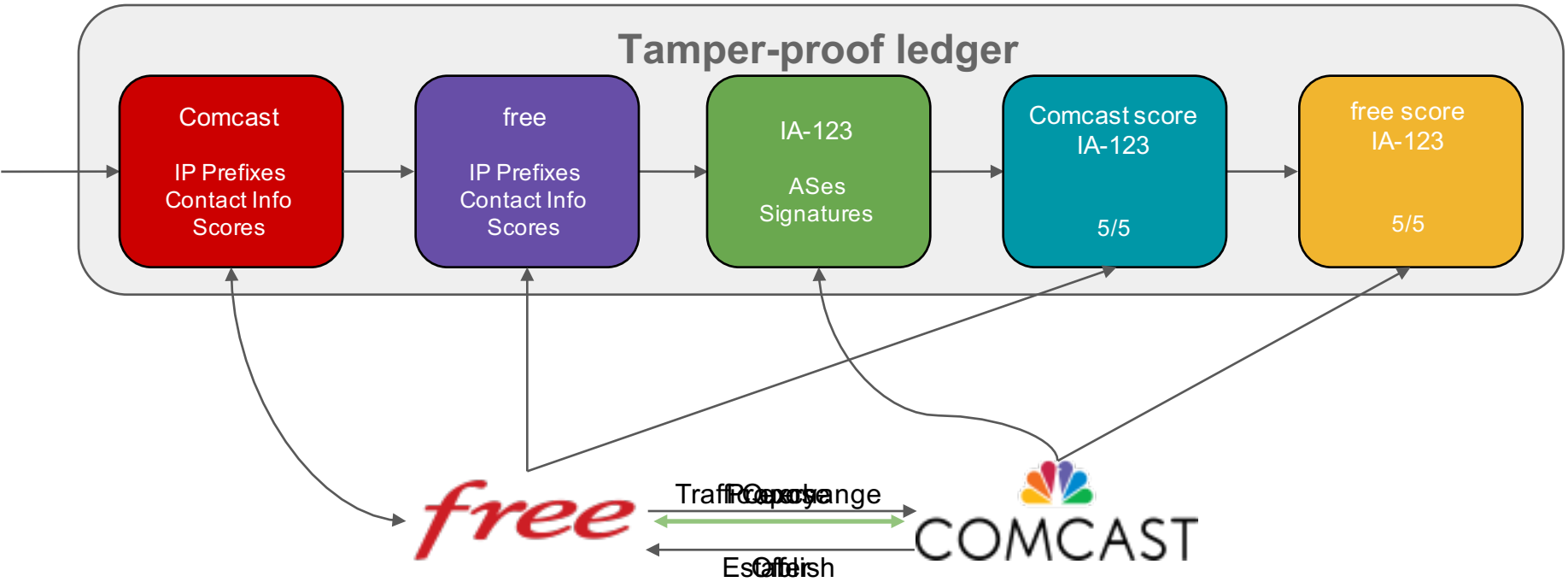
Example


Tamper-proof ledger
Comcast
IP Prefixes
Contact Info
Scores
free
IP Prefixes
Contact Info
Scores
IA-123
ASes
Signatures
Comcast score
IA-123
5/5
free score
IA-123
5/5
free
COMCAST

An *intent* is the relevant technical and business information associated a *target* and consists of a set of attributes

Routing

AS-PATH

SLA

Bandwidth
Latency
Packet loss
Jitter
Repair time
Guarantee
Availability

Pricing

Billing Method
Ingress Price
Egress Price

Time

Length

```
target: {
  routing: { attributes }
  sla: { attributes }
  pricing: { attributes }
  time: { attributes }
}
```

```
pricing: {
"ingress": e^(1/(sla.bwidth*time.length))-1
}
```

```
query(ASN, target, [properties])
```