Role-based Network Protocol Adaptability

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Overview

1. Reasoning
   - Why to adapt network protocols?

2. Network protocol adaptation in RoSI

3. Possible Use cases
   - Role based routing in DTN
   - Role based update in DTN
   - Role based Stack Parametrization
Is adaptation in Network Protocols a real need?

- Some requirements may not be known in advance
- Some desirable (sometimes conflicting) goals
  - Flexible
  - Maintainable
  - Efficient
  - Modular
  - Low complexity
  - Highly extensible
  - Fast to experiment/prototype
  - ...

What does layered architecture offers?

Layered protocol design

 Ensures modularity
 Ensures interoperability between systems
 Reduces system design complexity

Causes overhead
 Performance cost/efficiency
 Redundant functionality
 Slow prototyping/adoption

Restricts innovation / Political decisions

Elegant wired protocols

why cross layering / net adaptability is needed in IoT?

Dynamic nature
 Limited network resources
 Network complexity
 Fast prototyping needed
Cross-layer, the only option [3]

CLASS Framework [4]

Coordination Planes based Cross-layer Framework [1]
Can Role-based modeling / Role paradigm help anyhow?
• **Role-base modeling** captures context-dependent and collaborative behavior of objects, allowing to model complex and dynamic domains.[2]

• **Mainstream object oriented modeling languages** lack ways to model the systems behavior, as it dynamically emerges through collaborating objects.[2]

• The right parameter/algorithm for a communication protocol are context-dependent.
Possible Use cases

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Role based routing in DTN
Role based update in DTN

Credit: howdoeslooklike.com

- Updates under disruptions, network partitions or high delays
- Update transparent to upper layers
Role based Stack Parametrization

- Context based congestion control
- Under extreme conditions, stack change
Thank you
References

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