

# Optimised Test and Security Solution for P2P-based M2M Applications

22. ITG Fachtagung Mobilkommunikation

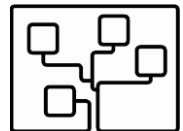
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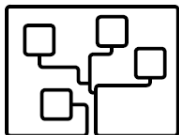


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# Outline

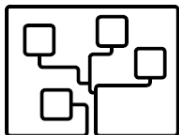
1. **M2M Application Provision**
2. **Motivation**
3. **Testing**
  - **Challenges and problems**
  - **Test Framework**
4. **Security**
  - **Risks**
  - **Trust concept**
  - **Integration of trust**
5. **Conclusion**

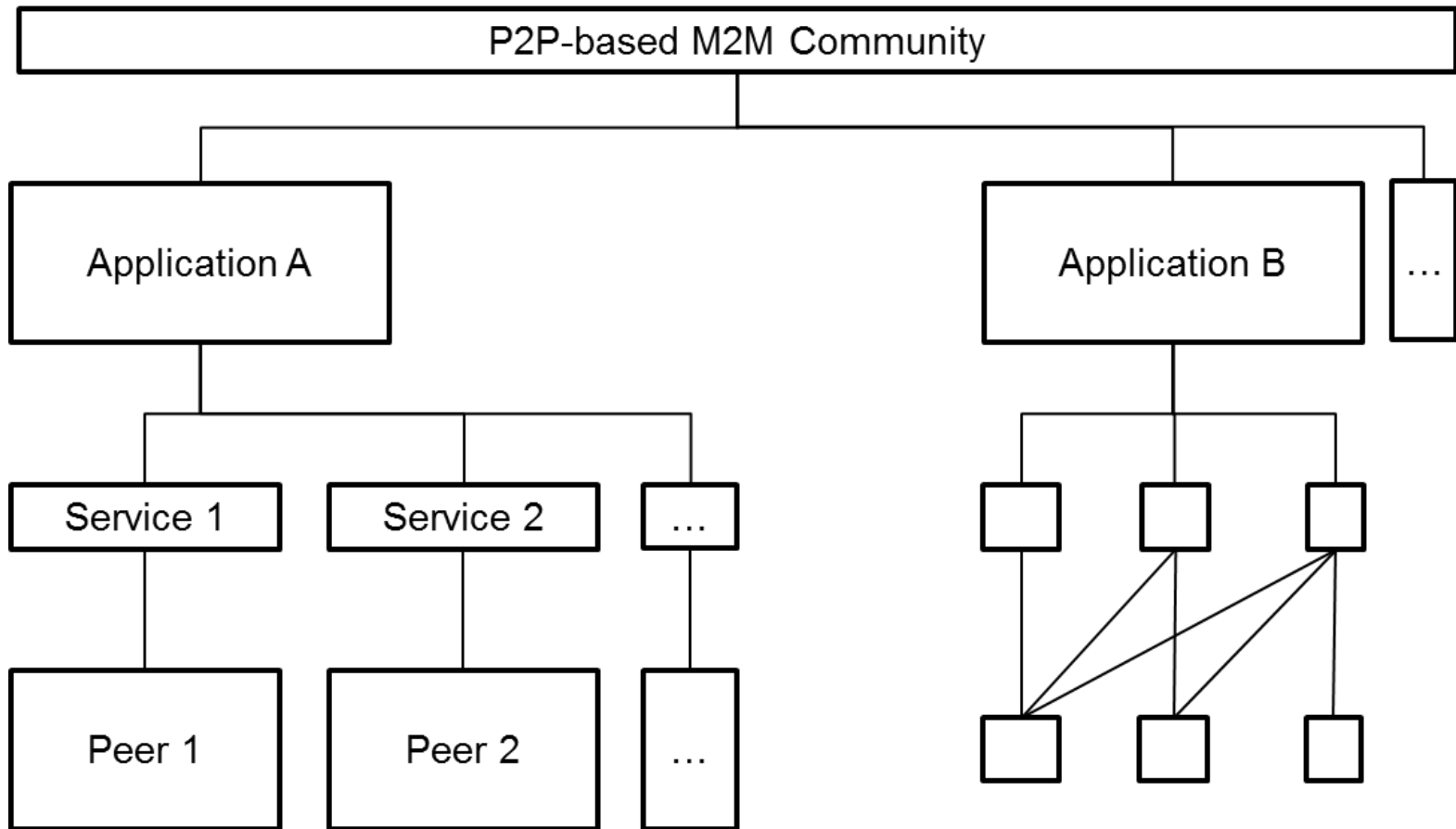


# 1 M2M Application Provision

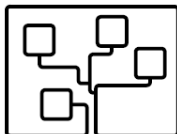
- **Various application fields in M2M**
  - **Energy management**
  - **Building surveillance**
  - **Smart Home**
  - **Traffic management**
- **Centralised and decentralised approaches for application and service provisioning**

<b>Features</b>	<b>Centralised</b>	<b>Decentralised</b>
Flexibility	x	✓
Efficiency	x	✓
No single point of failure	x	✓
End-User Integration	x	✓

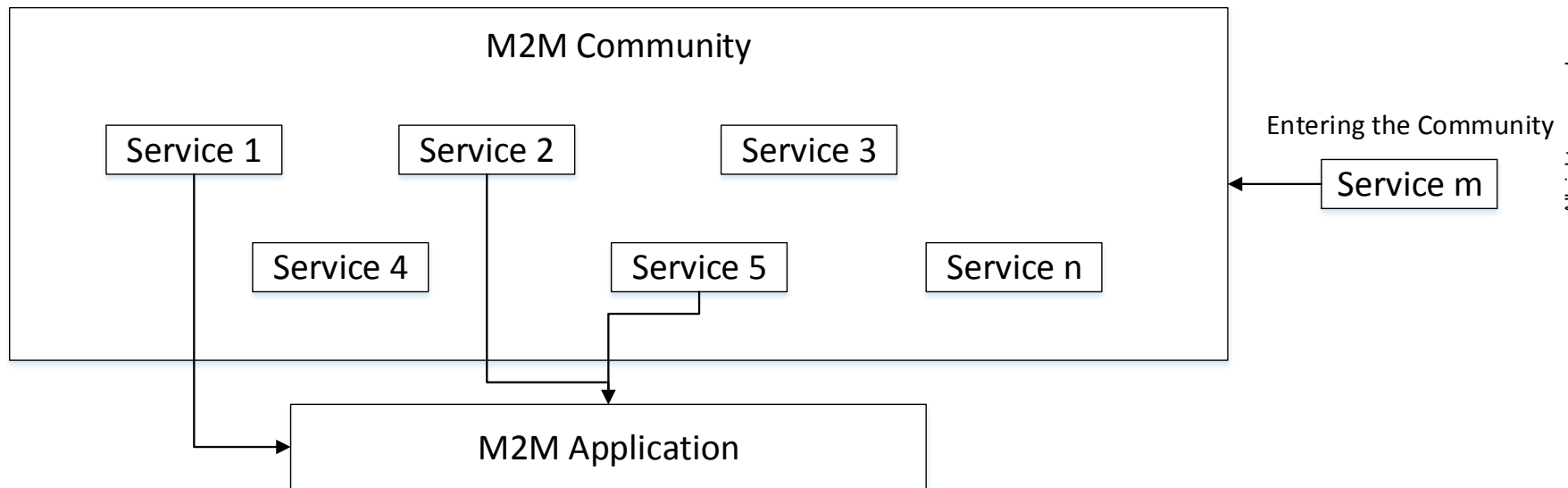




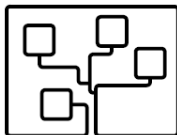
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- **Services are realised by one or more peers**
- **Application is a combination of one or more underlying services**
- **Peers are networked using P2P mechanism**
- **No centralised authority**
- **Participating peers form a social network of peers – M2M community**



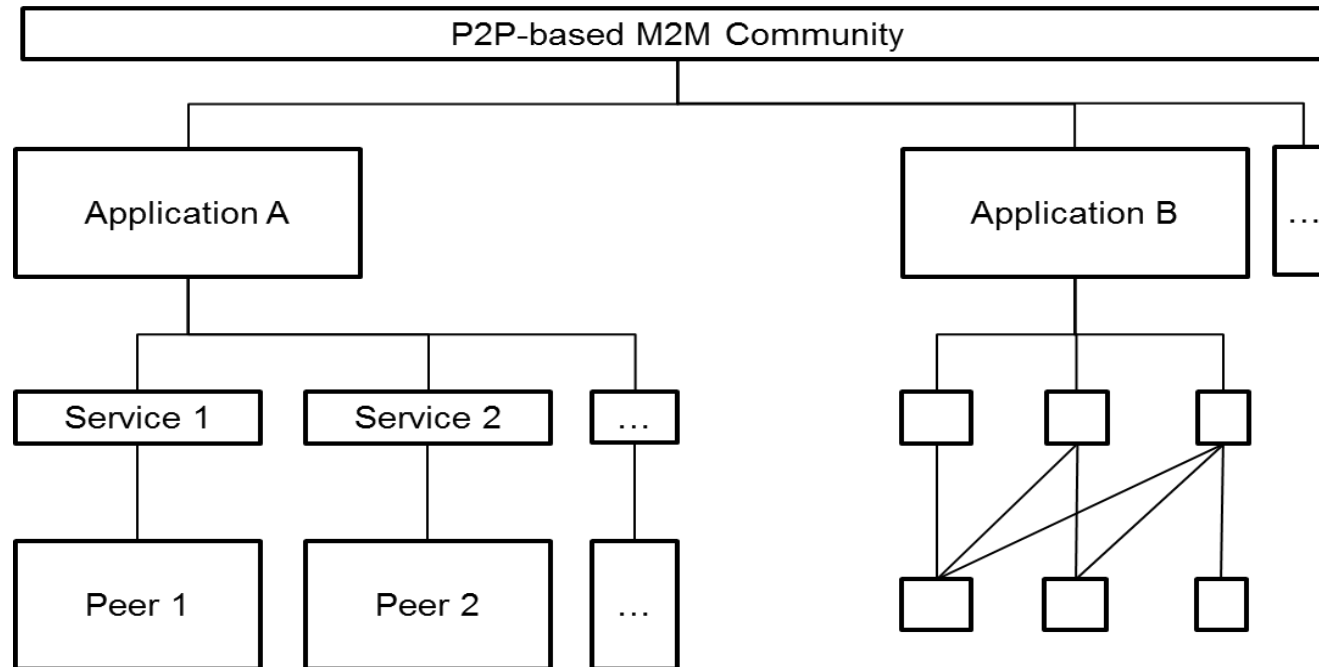
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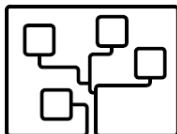
## 2 Motivation

Relevance for optimising test and security solutions:

- **Volatility of peers**
- **Cooperativeness and collaboration of peers**
- **Correct functionality of services**
- **Trustworthy peers**



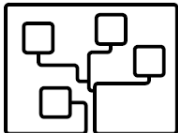
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# 3 Testing – Challenges

## Special challenges for testing P2P-based M2M applications

- **Decentralised architecture**
- **Distribution of service and application descriptions**
- **Observability and controllability**
- **Service quality**

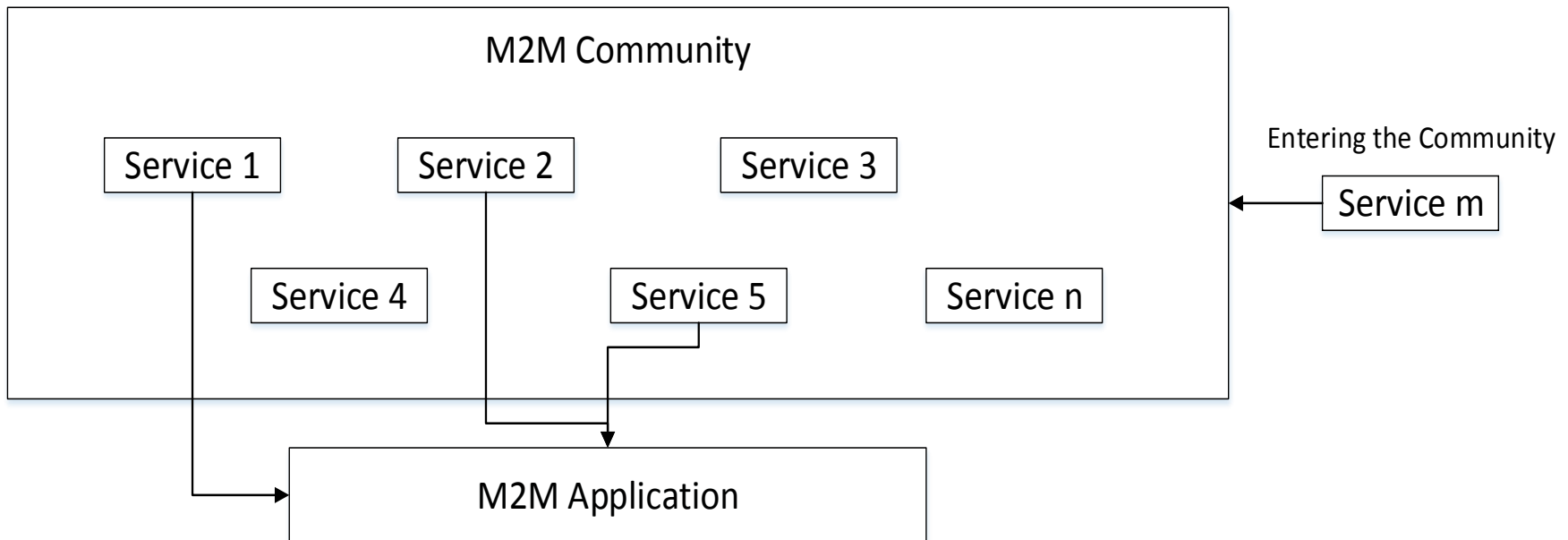


## Scenarios

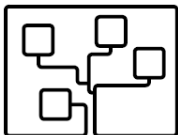
Test a service after it enters the M2M community

Test a service after the composition of an application

Test a composed application



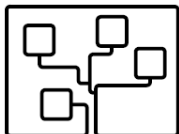
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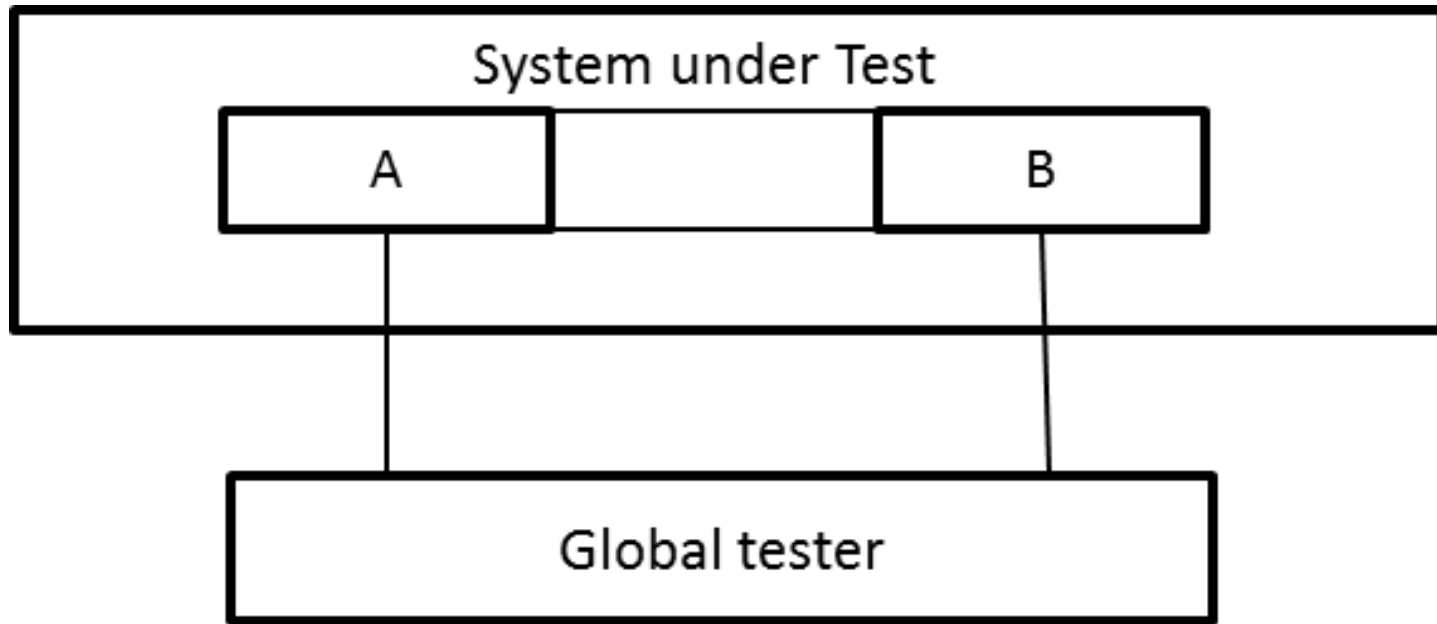


Requirement	Description
Collaboration	Between Application Creator, Peers and Test Environment
Deployment	Ability to deal with a high number of peers and volatility
Test Automation	Test process needs to be automated
Test Derivation	From gathered information test suites need to be derived
Verification	Test process should deliver results about the functionality of the SUT (service or application)
P2P and M2M capability	Support for P2P and M2M technologies
Trust Management System support	Shall be integrated within the test architecture

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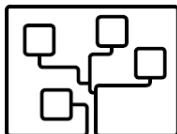


- **Global tester**

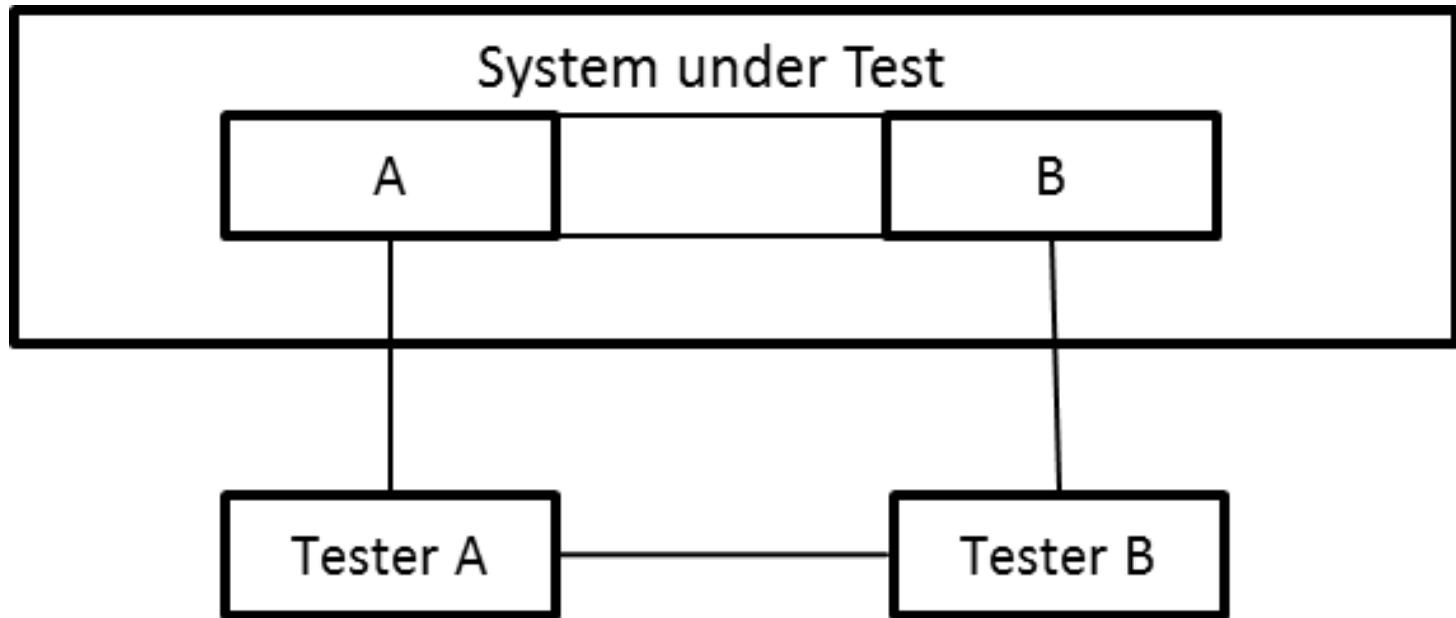


- **Disadvantages:**

1. **No usability for large-scale systems**
2. **Single point of failure**
3. **No P2P capability**

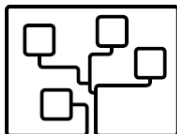


- **Distributed testers**

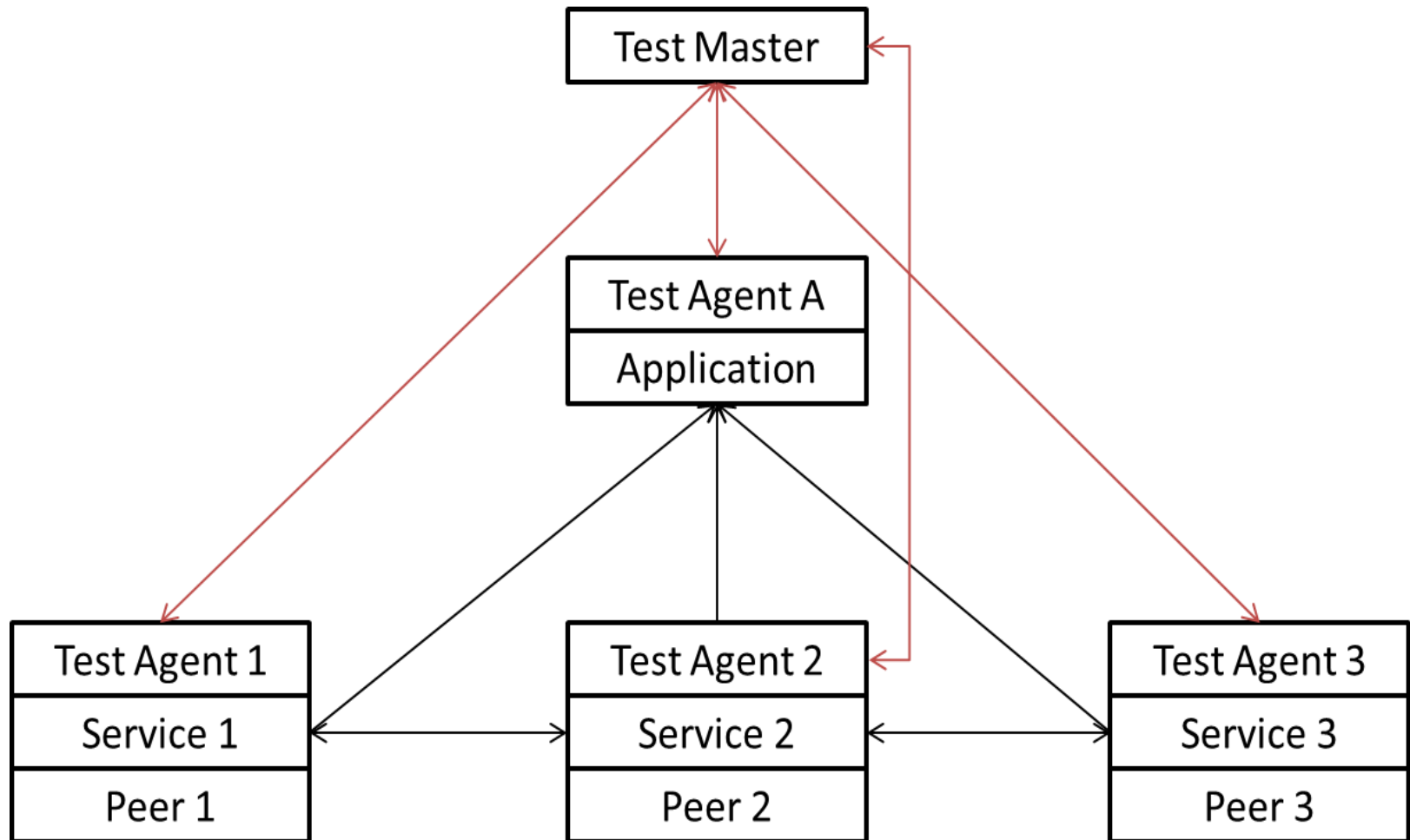


- **Disadvantages:**

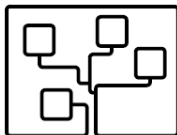
1. **No effective test derivation mechanism**
2. **High effort for synchronisation events for coordination between the testers**



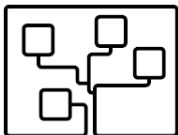
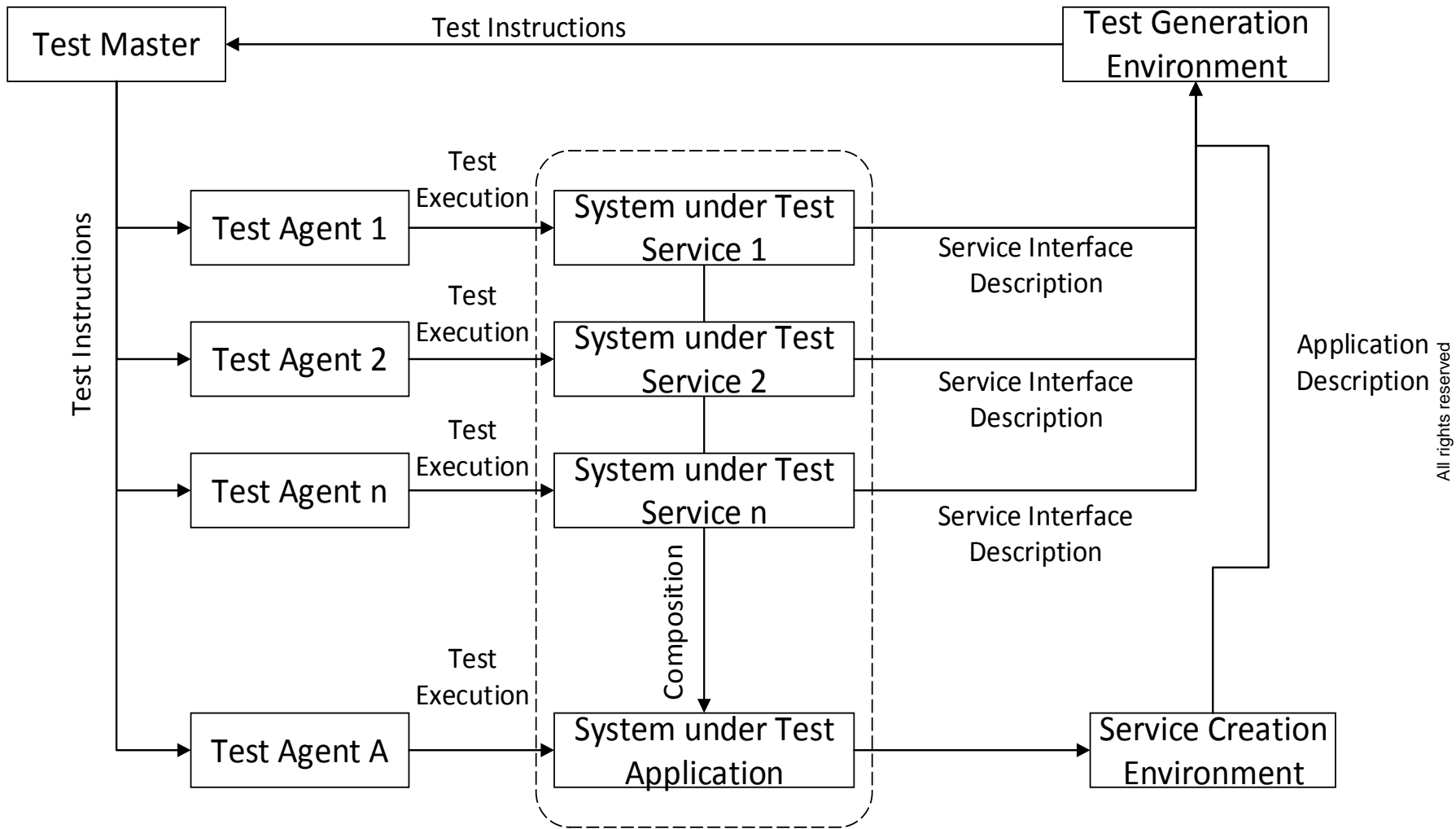
# Testing - Test Architecture for P2P-based M2M Applications 5



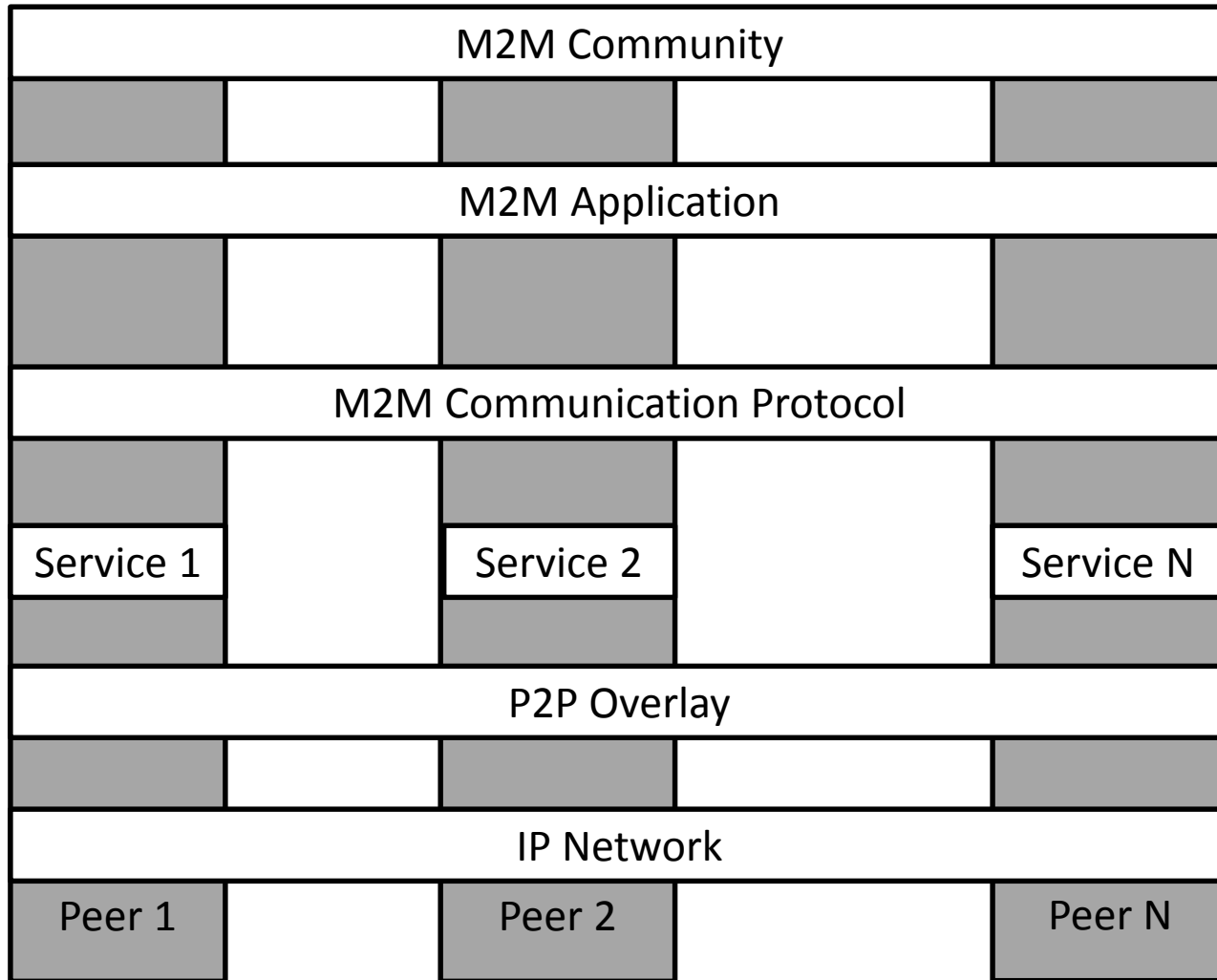
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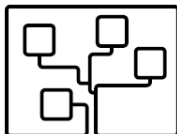
# Testing - Test Architecture for P2P-based M2M Applications 6



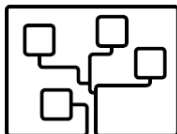
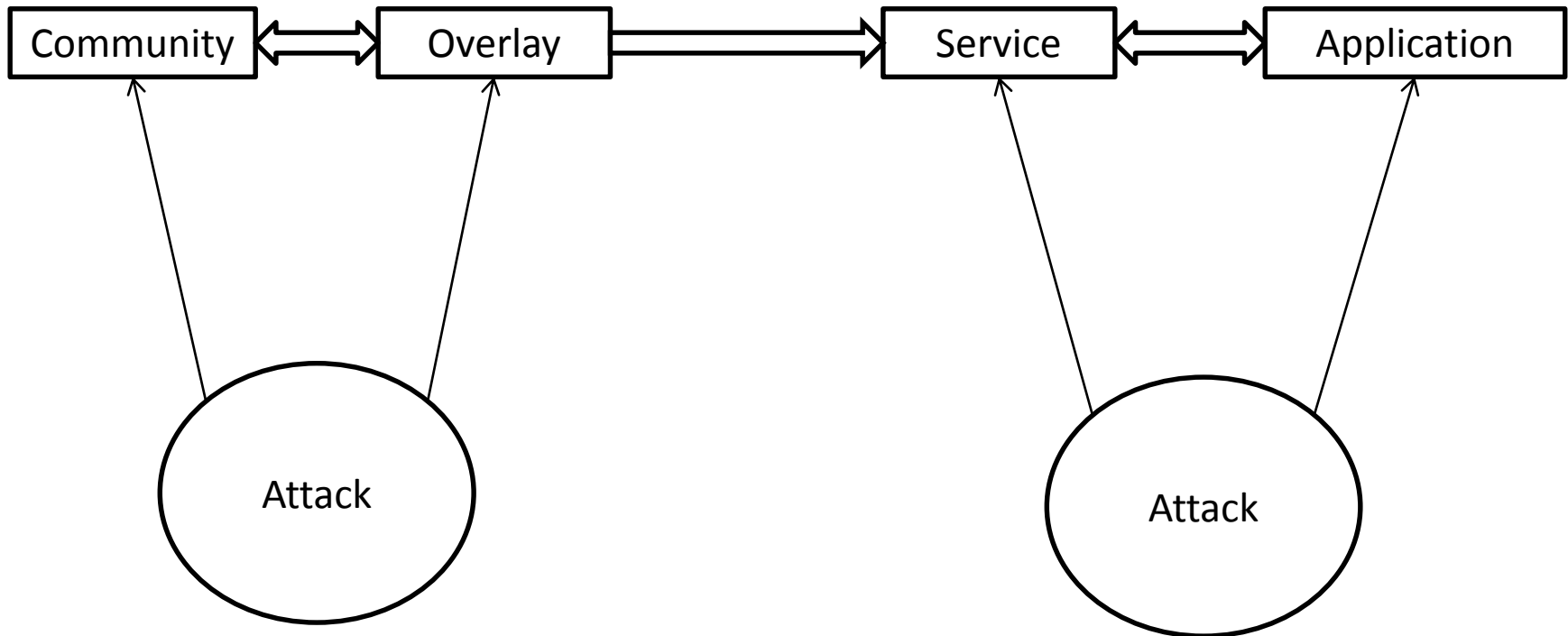
# 4 Security - Model for security considerations



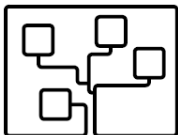
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- Attacks on the Community and the Overlay
- Attacks on the Services and the Applications



- **Trust as a tool for preventing attacks**
- **According to the ITU-T CG-Trust working group:**
  - **„Trust is an accumulated value from the history and the expecting value for the future.“**
  - **„Trust is quantitatively/ qualitatively calculated and measured which is used to evaluate values of physical components, value chains among multiple stakeholder and human behaviours including decision making.“**
  - **„Trust is broader concept that can cover security and privacy“**

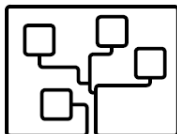




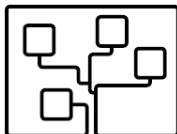
- Trust - data collection
- Trust - data analysis
- Trust - decision

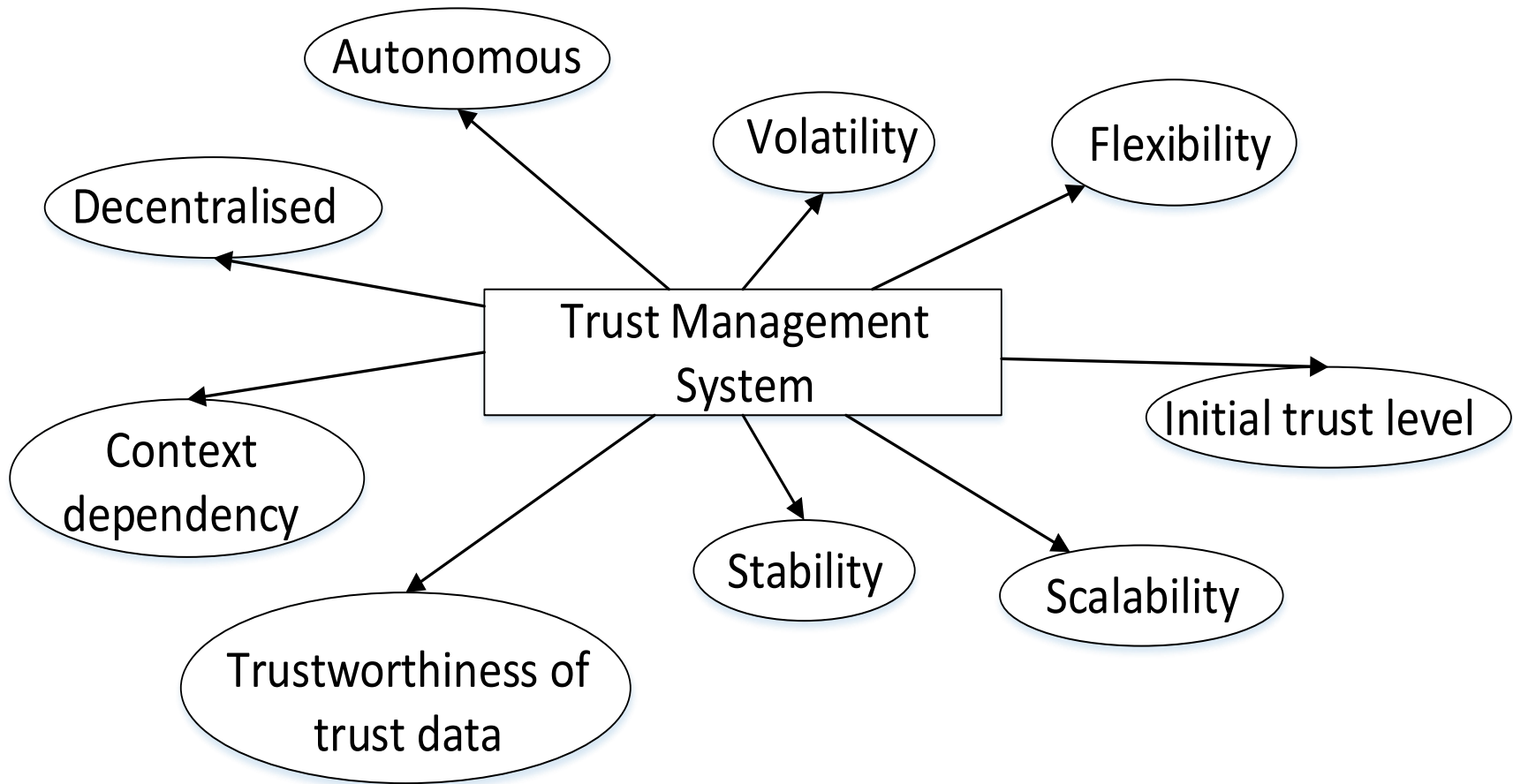
## Required elements

Trust metric	Measure to evaluate trust level
Trust model	Method to build trust relationships among peers
Trust level	Level of confidence between peers
Trust profile	Profile for storing and updating trust related information

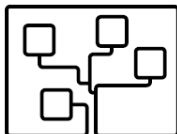


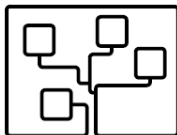
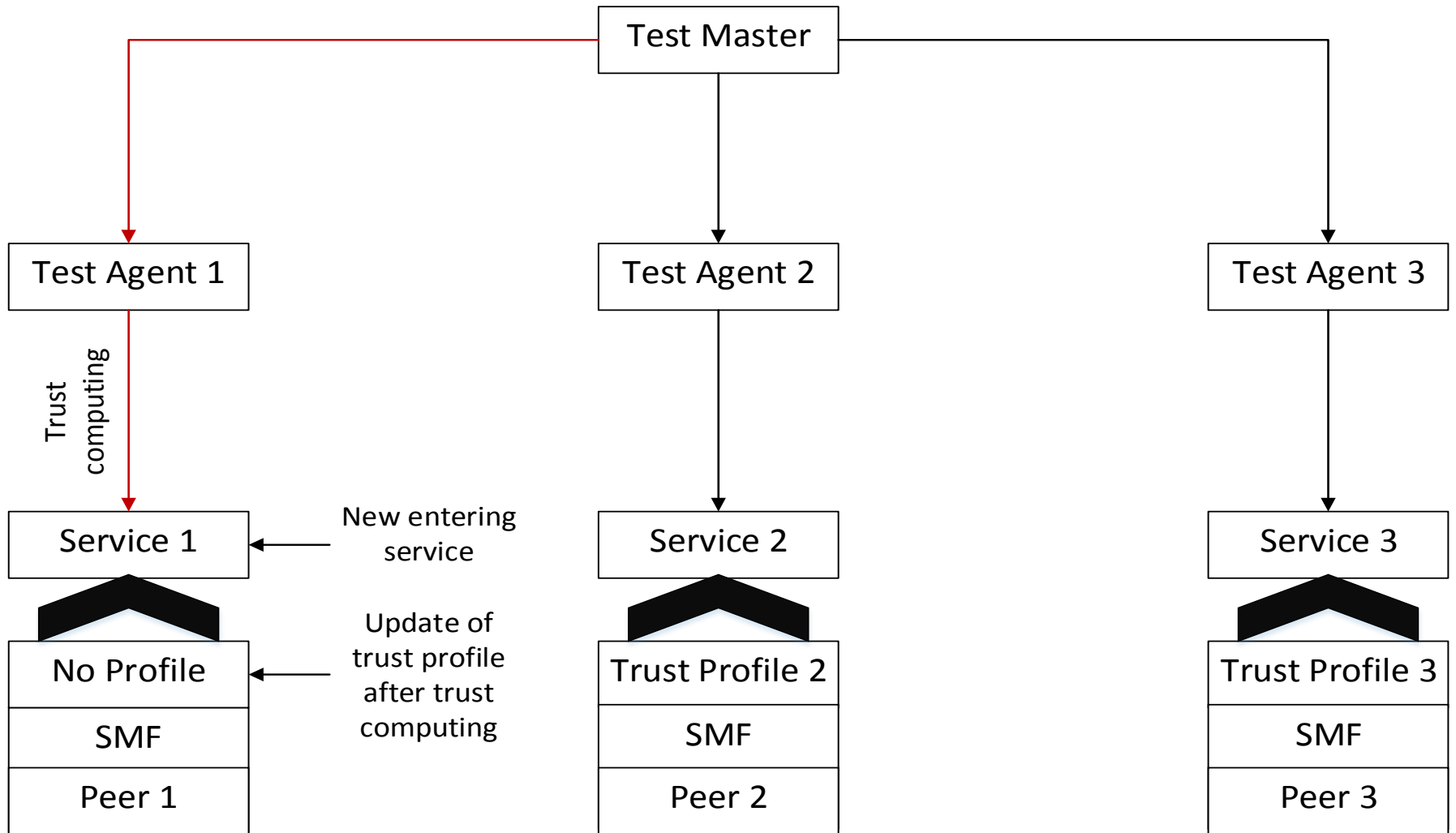
- **Trust in P2P-based M2M Applications can be applied to:**
  1. **Peers**
  2. **Services**
  3. **Applications**
  
- **Two cases for trust evaluation**
  1. **Trust for new provided services**
  2. **Trust for existing services**
  
- **Integration of a trust management system inside the testing framework**

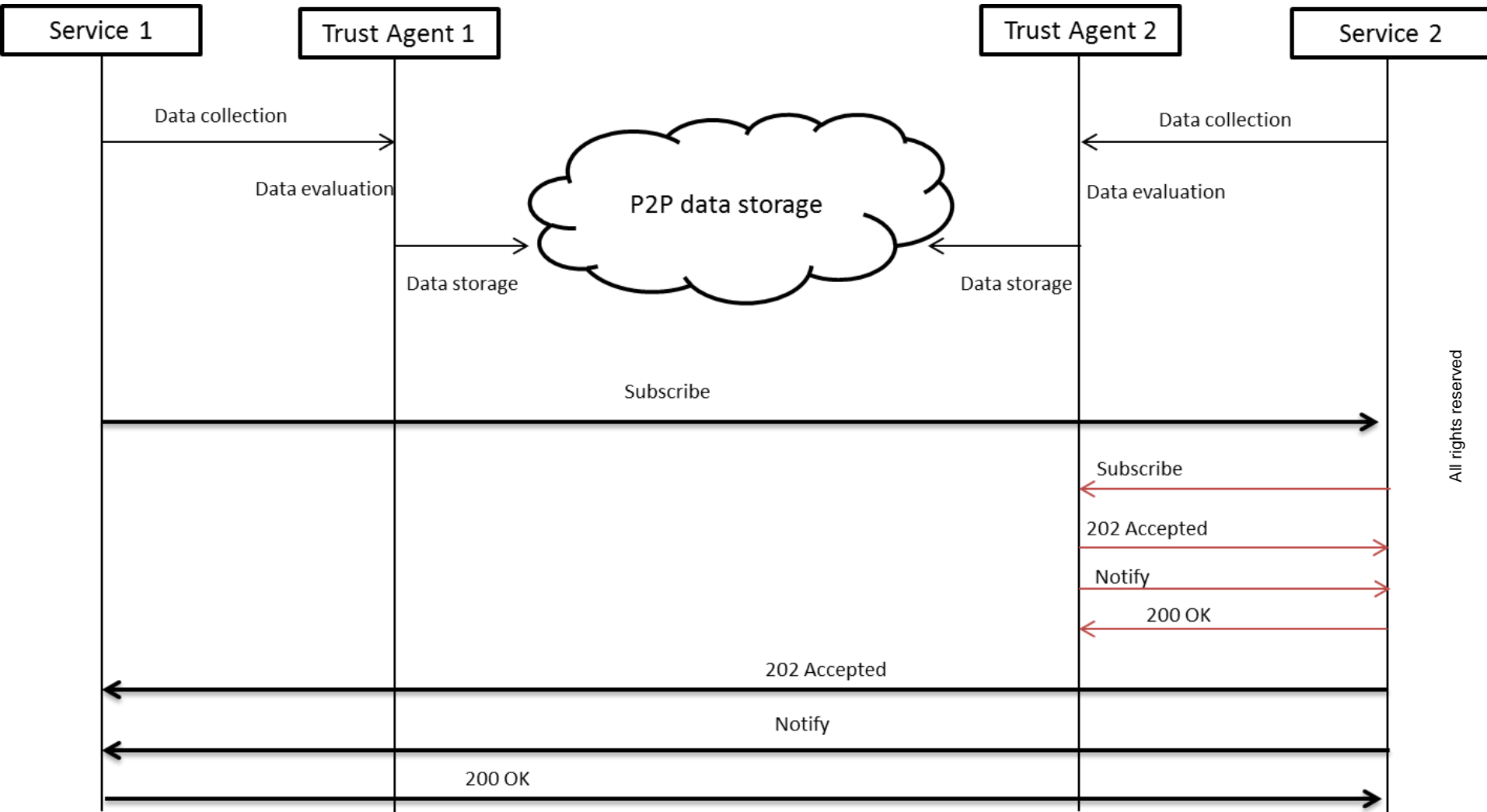




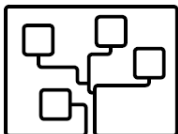
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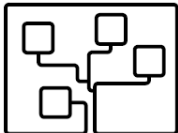


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# 5 Conclusion

- **Test Framework**
- **Security Evaluation**
- **Trust concept**
- **Integration of a Trust Management System**



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