ANSAINET 3.3.0

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In 2008, FIT-BUT have discovered OMNeT++

Our research at that time involved
- Reachability analysis
- Network behavior prediction

However, INET state-of-the-art at that time
- pure INET version 20061020 for OMNeT++ 3.3
- INET-MANET version for OMNeT++ 4.0
- A lot of missing features
  - ACLs
  - traffic generators
  - Cisco-like network packet dispatching behavior
  - Redistribution of routing information

We have decided to extend INET for our cause!
ANSA Project

BUT Network

cca 30000 devices

Running configs
SNMP

Topologies
configuration

Create model
OMNeT++ Model

Simulation results

XML Description

Improvements

Formal Analysis

e.g. ACL cross-referencing

Intro
Design
Outro
CONTRIBUTIONS

- SIVÁK Vladimír. Modelling Cisco Router in Simulation Tool OMNeT++.
- SUCHOMEL Tomáš. OMNeT++ Extension with ACL Filtering Module.
- SCHERFEL Peter. Simulation of Network Behaviour Based on Analysis of Configuration of Active Network Devices.
- MATELEŠKO Petr. Multicast Simulation in OMNeT++.
- ČERNÝ Marek. IPv6 Modelling in OMNeT++.
- KRAUS Zdeněk. Modelling and Reliability Analysis of Campus Network at the BUT.
- HRNČIŘÍK Matej. Modelling of L2 Loop-Preventing Protocols.
- RYBOVÁ Veronika. Multicast Routing Modelling in OMNeT++.
- MALÍK Adam. Multicast Distribution Trees Modelling in OMNeT++.
- MAREK Marcel. Modelling IS-IS and TRILL.
- PROCHÁZKA Tomáš. Modelling PIM-SM in OMNeT++.

Today’s metric

25 000 SLOCs
ANSA Router

Intro
Design
Outro
ANSA MultiNetworkLayer

- offers up to triple-stack parallel support of IPv4, IPv6 and CLNS
- allows multiplexing for data-link layer protocols
- mimics processing behavior of reference Cisco router
**ANSA MultiRoutingTable**

- ANSA MultiRoutingTable
  - enhances IPv4/IPv6/CLNS routes
  - employs additional administrative distance constants
  - Cisco-like appearance

![Routing Table Diagram]

```
routes (IPv4Route *)
elements[9] (inet::IPv4Route *)

[0] = ba 10.0.1.0/24 [125/96] via 10.0.14.1, eth1
[1] = ba 10.0.2.0/24 [125/192] via 10.0.14.1, eth1
[2] = ba 10.0.3.0/24 [125/96] via 10.0.34.3, eth0
[3] = C 10.0.4.0/24 is directly connected, eth2
[5] = C 10.0.14.0/24 is directly connected, eth1
[6] = ba 10.0.23.0/24 [125/96] via 10.0.34.3, eth0
[7] = C 10.0.34.0/24 is directly connected, eth0
[8] = C 127.0.0.0/8 is directly connected, lo0
```
**ANSA Interface Entry**

- ANSA Interface Entry
  - registers additional parameters like delay, reliability, virtual forwarder
**Configuration**

- Default INET’s **NetworkConfigurator** does not suite our needs
- Each simulation module supports initialization from external XML file
- Per-interface config is setup by **MultiNetwork Configurator**
FEATURES

- Currently supported in ansainet-3.3.0 for OMNeT++ 5.0
  - multicast, PIM-DM, PIM-SM
  - RIP, RIPng
  - IS-IS, TRILL
  - EIGRP, Babel
  - LISP
  - CDP, LLDP
  - HSRP, VRRP, GLBP

- Upcoming
  - OSPFv3
  - revisit IPv6
  - revisit DHCP

- Abandoned
  - STP, RSTP
  - ACL
  - QoS (PQ, WFQ, CBWFQ)
  - Traffic Generators
CITED BY


- LISP simulation modules are recently being used by GMV Innovating solutions

- Placeholder for your citation of our framework 😊
REFERENCES

- Project webpage
  - https://nes.fit.vutbr.cz/ansa/

- Project GitHub repository
  - https://github.com/kvetak/ANSA
  - Master branch is ansainet-3.3.0
  - Other supported branches
    - ansainet-3.2.1
    - ansainet-2.2
    - ansainet-2.1
    - ansainet-2.0

- Thank you for your attention! Questions?