Using AONNs to Identify Network Nodes

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Introduction

- **Goal**
  - To improve the way devices are identified for the future of mobile computing.
  - To help permanently eradicate the threat of address space exhaustion.
  - To aid routing protocols.
  - To promote respect for nodes in a network and promote smarter reliable routing.
- **Context**
  - IP addressing is not suitable for dynamic Mobile Ad-hoc Networks (MANETs).
  - It is based on physical location of static infrastructure nodes i.e. Router, switches etc.
  - IPv6 is a 128 bit address, which can produce a maximum of $1.4 \times 10^{32}$ unique addresses
  - 3GPP LTE advanced will be all IP packet switched thus a potential of 4.6 billion new IP-based devices.
  - IPv6 increases address space greatly, but still provide only static information.
  - MobileIP has been developed to help ease of handover from network to network
  - Content and Characteristic-based routing protocols use characteristics, such as location or the contents of a message, to route traffic
  - Assumption: In highly dynamic MANETs it is more beneficial to know what kind of device your payload is being routed through for reliability and respect for other devices in the network.

Agent-Oriented Neural Network

- **Structure**
  - Structure similar to Multi-Layer Perceptron.
  - Devices’ usage data fed into Input layer through standardised channels.
  - Each Neuron designed to be a deliberative Agent.
  - Identity is evolved over time.

Evolved Personal ID (EPID)

- Device is used in a certain way (by a user if applicable).
- As the hardware is accessed the identity evolves over time.
- The more a particular hardware is used the more that feature becomes prominent in the devices personality.

Research Challenges

- **Computational Expense**
  - The AONN can require a large amount of computational power
  - With the introduction of Agents in the AONN the amount of computational expense is increased greatly.
- **Readability of EPID**
  - The standardisation of hardware modules to be monitored and where they feed into the AONN was essential for the universality of the EPID.
- **Network Payload Increase**
  - The EPID is generated either as a matrix of $64 \times 64$ or $32 \times 32$, 0 - 7 byte pattern so to send the full ID across a network would create huge increase in network load.
  - To combat this, varying levels of EPID detail can be sent across the network.

Conclusion

- The EPID is a very effective way of generating a very large number of unique device IDs.
- Each ID gives a very detailed picture of how the device is used.
- The computational power required to generate the ID is quite significant so for nodes with low computational power the AONN could prove to be too much for it to handle.
- The EPID reflects the personality of a device. As such it could lead to the simplification of routing protocols.

Further Information

- Contact Information
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