OPEN NETWORKING & EDGE SUMMIT

Goodbye Aloha

A. Laya, C. Kalalas, F. Vazquez-Gallego, L. Alonso and J. Alonso-Zarate, "Goodbye, ALOHA!," in *IEEE Access*, vol. 4, pp. 2029-2044, 2016, doi: 10.1109/ACCESS.2016.2557758.

Independent Jury Recognition

Google Research Award

M2M BELL

15/16 IoT/M2M INNOVATION WORLD CUP

Vint Cerf at Singularity U.

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What is Aloha?

- Collision Detection
- Retransmissions
- Predates Ethernet

Where is it?

- ZigBee, LoRa, SigFox
- RFID, Satellites, WiFi
- 5G RACH

Why do we use it?

- It’s simple and it works

Why replace it?

- Maximum Efficiency is 50%

The Solution: Invented for Cable TV

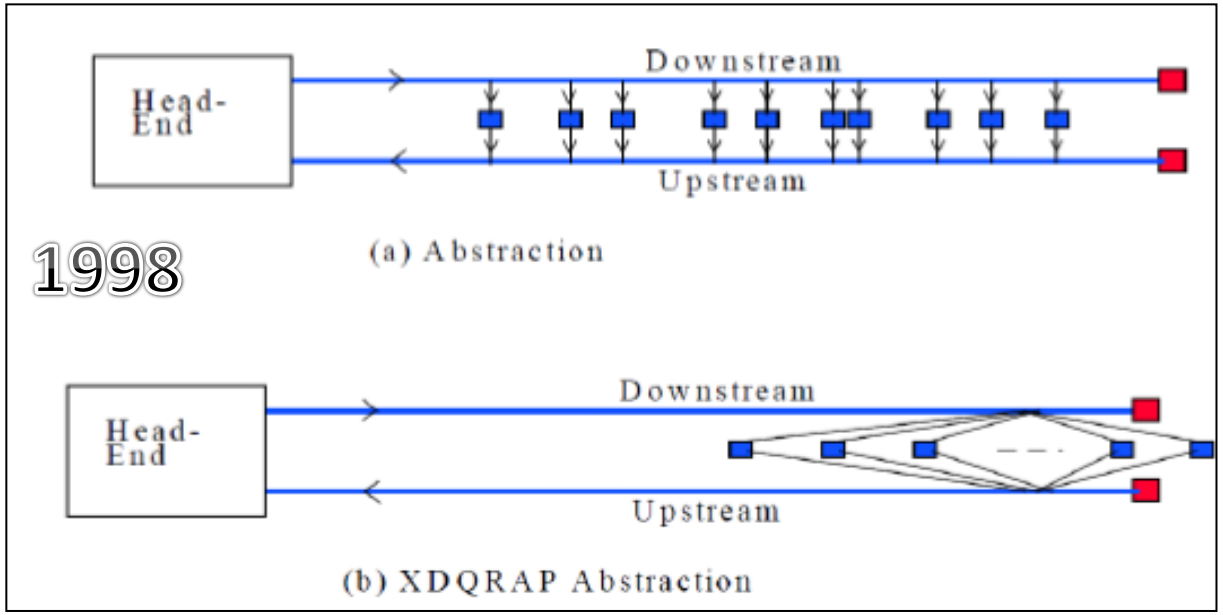
1993

Multicast status -- a delta document

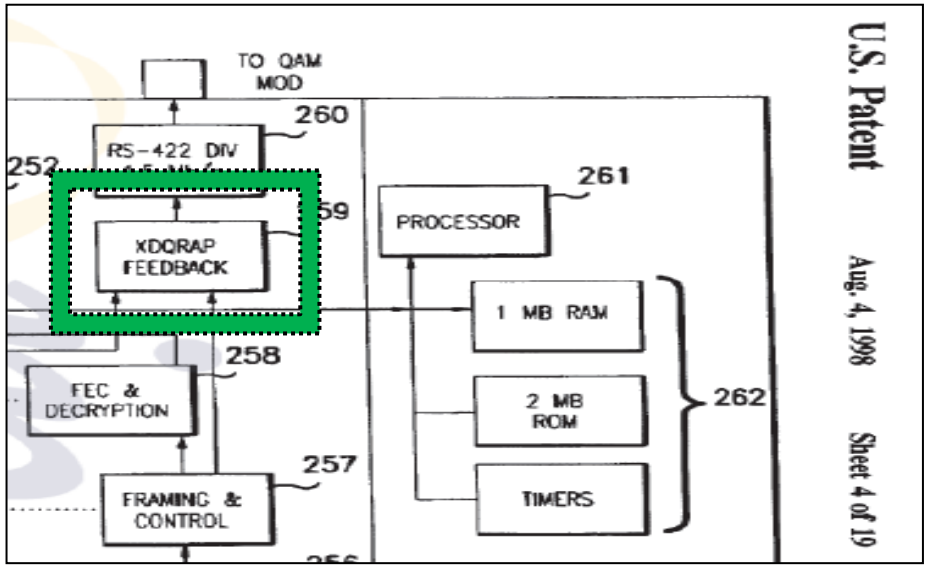
Layer	Multi-vendor stds-based, shipped product	Stable Protocols	Active Development	Dreaming
Application			x MTA, NFS, WWW	
Session		x RTP, ST-II		
Transport		x XTP		
Network	x multicast IP			
Datalink				x DQRAP
Physical			x	

United States Navy

Georgia Tech Research Inst.

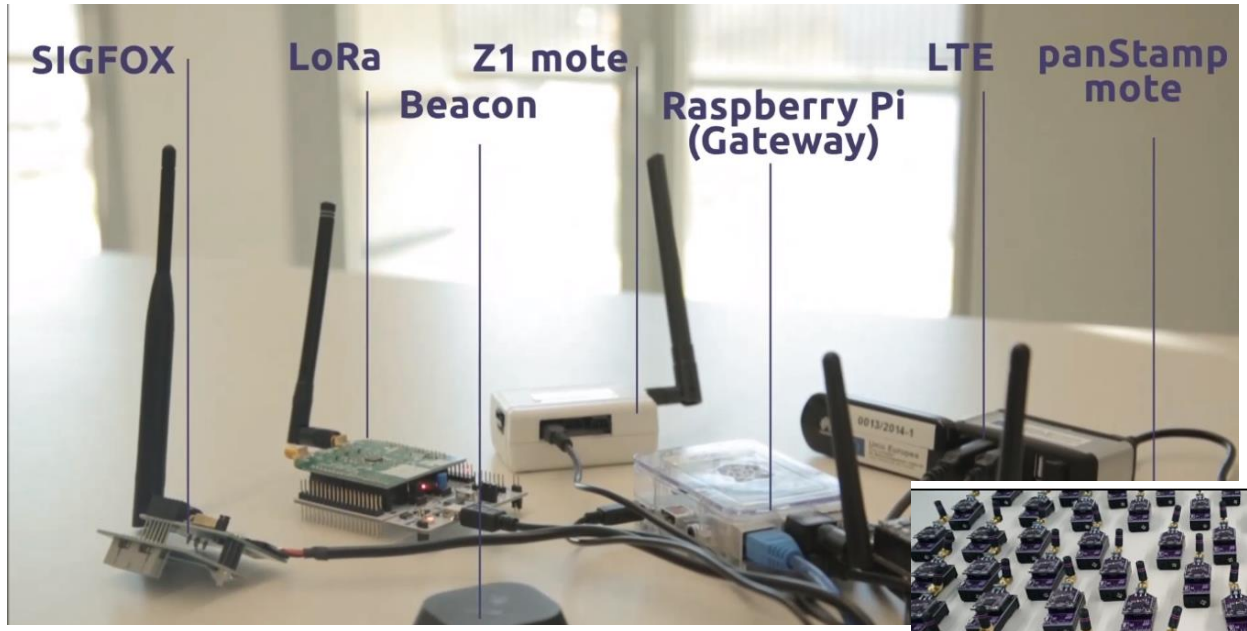


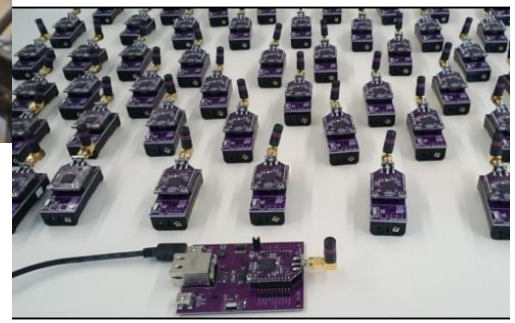
Scientific Atlanta



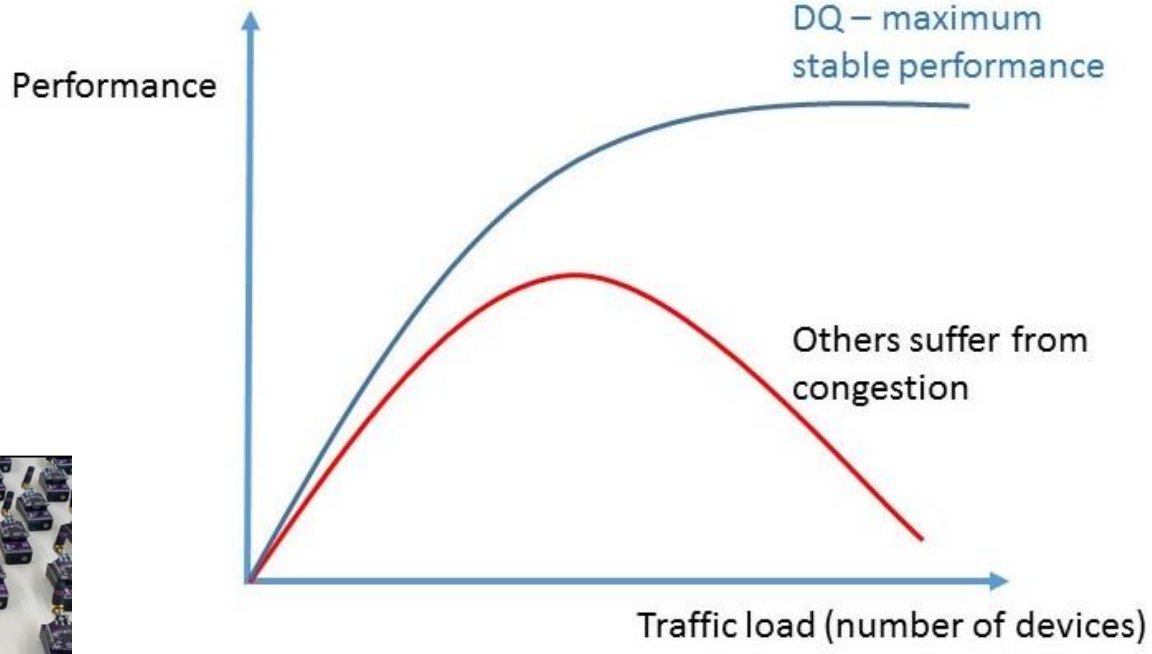
1st DEMO – Barcelona, IoTWorldDQ at CTTC

Distributed Queuing (DQ) is a revolutionary technology that will change the way that wireless networks operate in the future.





http://technologies.cttc.es/iotworld-experimental-platform/iotworld-dq/



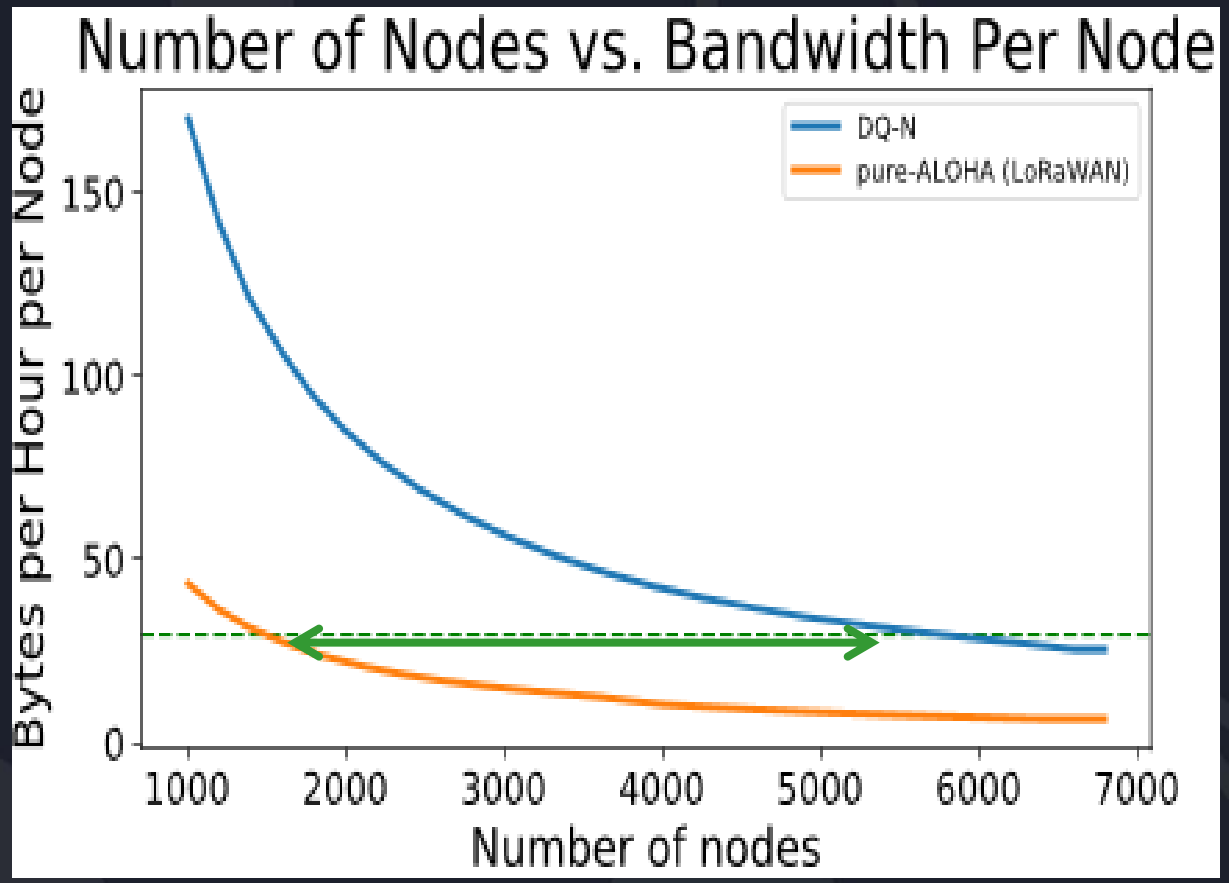
Swapping DQ with Aloha

Its key features are:

- **Infinite number of connected devices**
- Fair resource allocation among nodes
- Traffic prioritization: QoS-enabled
- No congestion under any load conditions
- Stable maximum performance
- Performance independent of network size
- Performance independent of network composition (no need to know the devices associated to the network). **This is a key value for the IoT.**
- Maximization of data transmissions
- Collision-free data transmissions
- Minimization of silence periods (no backoffs or random waiting windows).
- Performance independent of traffic load
- Ultra-Low energy consumption

	ALOHA	DQ
Packets Sent	140	82
Packets Received	70	81
Success Rate	50%	98.45%
Empty	35%	1.55%
Error	15%	0%

2nd DEMO – Philadelphia at Bucknell



Bucknell Digital Commons: **A Platform for Large-Scale Regional IoT Networks**: https://github.com/Kuree/DQN

A Comprehensive Distributed Queue-Based Random Access Framework for mMTC in LTE/LTE-A Networks With Mixed-Type Traffic

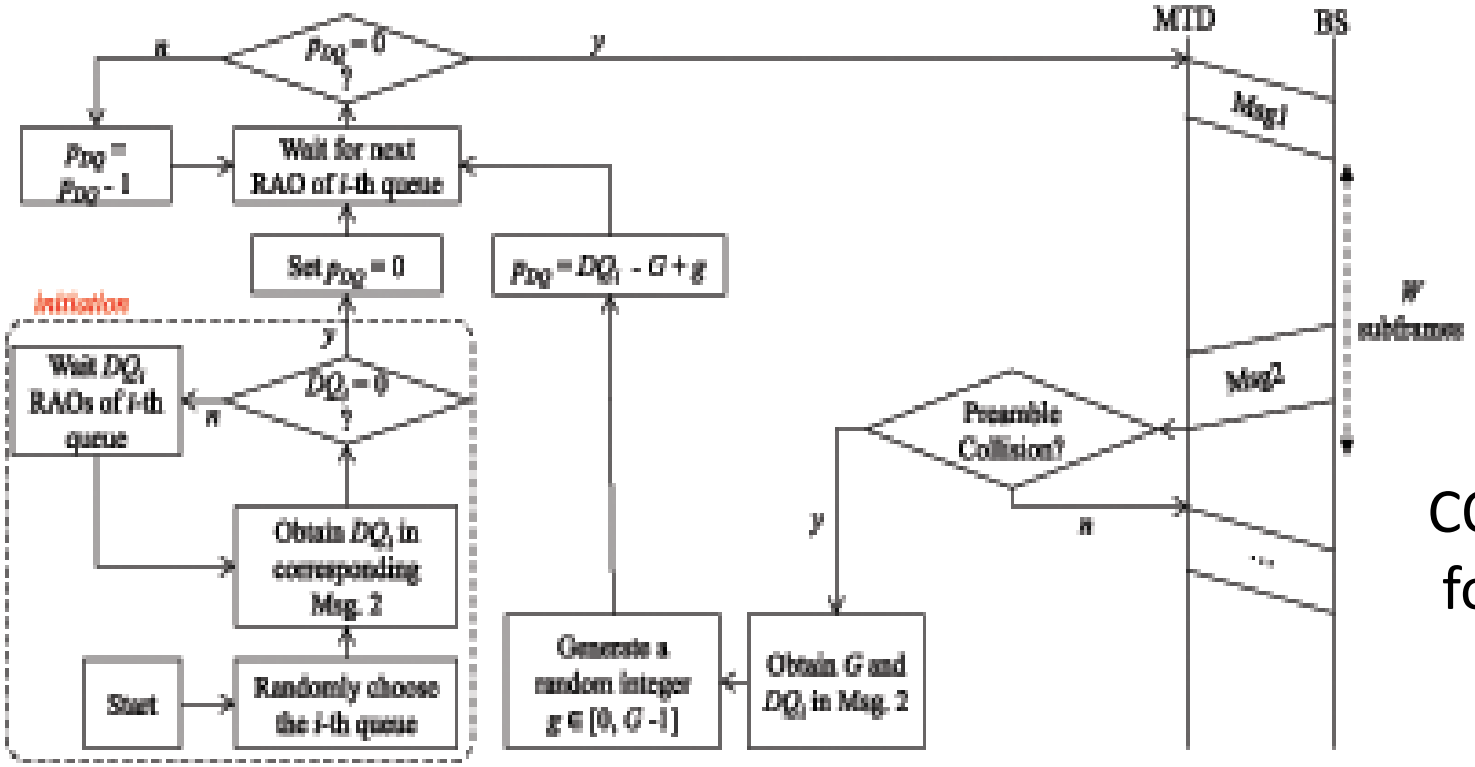


FIGURE 8. Access procedure representation of the proposal.

CONCLUSION: **"HIGHLY FEASIBLE"** for two big problems in 5G

- MASSIVE ACCESS
- DYNAMIC PRIORITY