LATENCY AND POWER CONSUMPTION OPTIMIZATION IN D2D TRANSMISSION SYSTEMS ON COOPERATIVE NETWORK ARCHITECTURES

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1. Motivation

- ✓ 5G networks results in growing data traffic to multiple mobile terminals and this means a large consumption of network resources, power and processing (Figs. 1 and 2)
- ✓ In Worldwide, the Internet access and multimedia services through cellular infrastructure have high demand, but the high cost and relatively low access speed offered by operators represents a problem for the expansion of services 5G (Table 1)

Fig. 1. Global Mobile Data Traffic Forecast by Region
Source: Cisco VNI Mobile, 2016

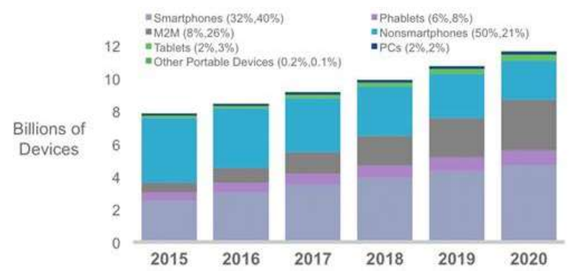

Fig. 2. Global Mobile Devices and Connections Growth
Source: Cisco VNI Mobile, 2016

Tab. 1. Precios de internet en naciones sudamericanas

País	Velocidad (Mbps)	Precio ($us)	$us x Mbps	Promedio $us x Mbps	Salario mínimo $us	1Mbps como % salario mínimo nacional
Uruguay	30	52,51	1,8	1,27	420	0,30
	50	68,43	1,4			
	120	84,35	0,7			
Chile	20	52,83	2,6	1,84	410	0,45
	40	65,51	1,6			
	120	147,97	1,2			
Brasil	25	50,07	2,0	1,49	313	0,47
	50	65,11	1,3			
	100	115,23	1,2			
Bolivia	4	218,66	54,7	55,07	145	37,98
	6	335,27	55,9			
	8	437,32	54,7			
Argentina	3	26,00	8,7	5,18	619	0,84
	6	28,26	4,7			
	30	65,21	2,2			
Perú	20	159,61	8,0	6,08	291	2,09
	35	190,38	5,4			
	45	217,00	4,8			
Paraguay	6	64,70	10,8	13,31	415	3,21
	7	97,79	14,0			
	10	151,71	15,2			

Source: ATT, 2015

- ✓ Device-to-Device (D2D) communications and content caching can efficiently support the growth in mobile data traffic from the cellular infrastructure (Figs. 3 and 4)

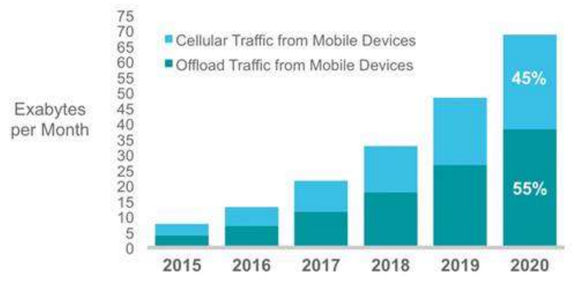

Fig. 3. Global Mobile Devices and Connections Growth
Source: Cisco VNI Mobile, 2016

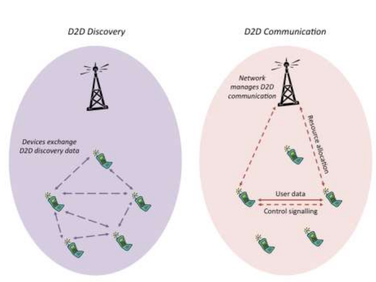

Fig. 4. D2D Transmission Systems

2. Objectives

General

- ✓ Propose an efficient scheme for D2D transmissions and content caching to reduce latency and power consumption in 5G networks

Specifics

- ✓ Review critical aspects of cooperative and opportunistic D2D transmissions and content caching mechanisms in wireless networks
- ✓ Determine the impact of caching mechanisms and cooperative and opportunistic transmission over latency and power consumption in D2D transmission systems
- ✓ Implement a conceptual proof for the proposed scheme
- ✓ Present an analytical development about effects of caching mechanisms and D2D transmission systems on the interaction of mobile terminals

3. Methodology

Review of State of the Art about 5G networks

- Opportunistic transmission
- Cooperative communications
- Content Caching Mechanisms

Propose an Evaluation Framework

- For Opportunistic and Cooperative Transmissions and Content Caching on D2D wireless systems

Measuring the impact

- Over latency, power consumption and bandwidth on D2D transmission environments

Propose a theoretical model

- For opportunistic D2D communication systems
- Simulation and evaluation of the latency and power consumption

Develop an implementation scheme

- Implement a conceptual proof of the proposed scheme through simulation
- Document the effects of the proposed scheme in the interaction of mobile terminals

4. Research Plan

Activity	2016					2017					2018				
	Jan	Apr	Jun	Aug	Dec	Jan	apr	Jun	Aug	Dec	Jan	Apr	Jun	Aug	Dec
State of the Art on D2D opportunistic transmission systems and caching															
Propose an Evaluation Framework															
implementation schemes on D2D transmission systems															
Development and validation of analitical model for D2D															
Simulation and evaluation of proposed D2D communication															
Publication of results in conferences and international journals															
Preparation of the PhD Disertation															

5. Expected Results

- ✓ An evaluation framework for implementation schemes applicable to cooperative D2D communications on wireless networks
- ✓ An analytical model based on optimization theory for cooperative D2D transmission systems and simulate their behavior and determine its latency and power consumption
- ✓ An efficient scheme for implementation of opportunistic D2D transmissions and content caching on wireless networks
- ✓ Research reports and publication of results in conferences and international journals

6. References

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