

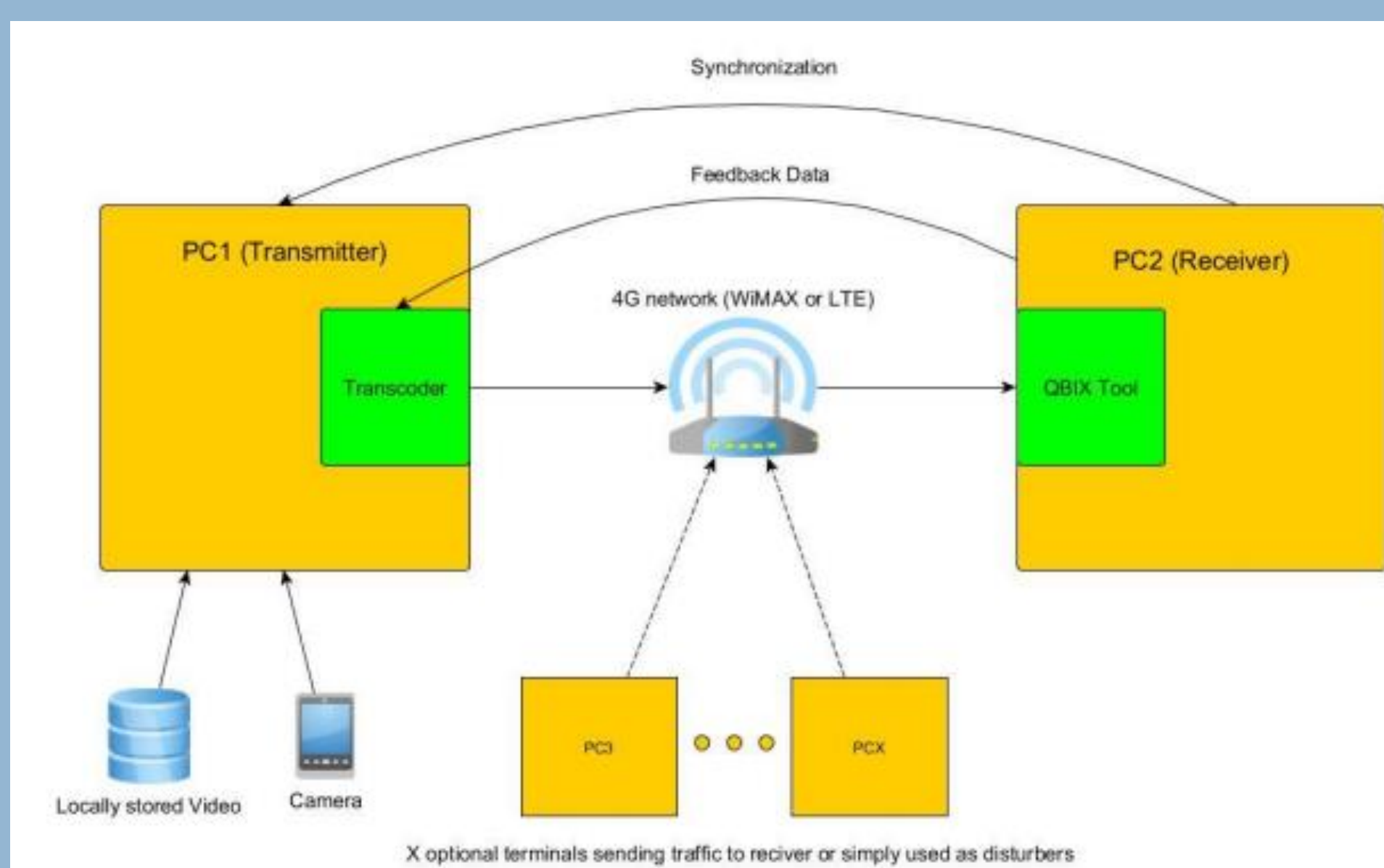
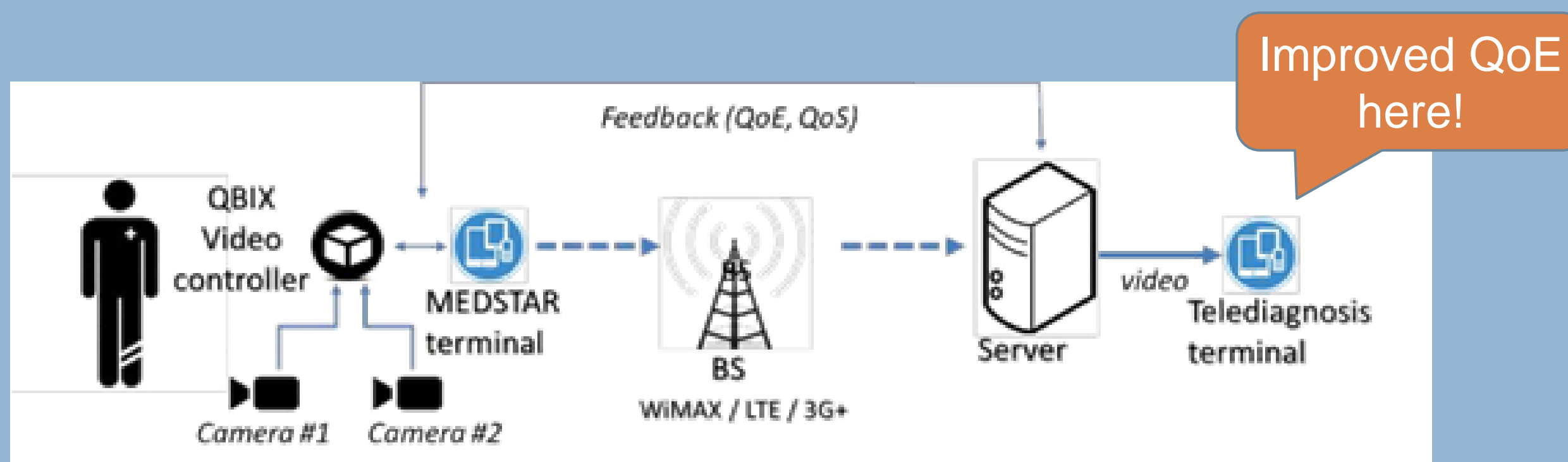
## GOALS

- testing innovative QoE Video Controller features with different network technologies (WiMAX, LTE),
- verifying reliability and tune the Video Controller logic to improve QoE
- evaluating the congestion control rules for selected use-cases (i.e. MedStar eHealth application)

## CHALLENGES

- Hard to get access to Base Station parameters and network statistics in normal tests
- Switching between different technologies would require lot of work and investments (at start our video controller were developed with WiMAX in mind)
- In testbed, there was perceptible lack of mobility testing

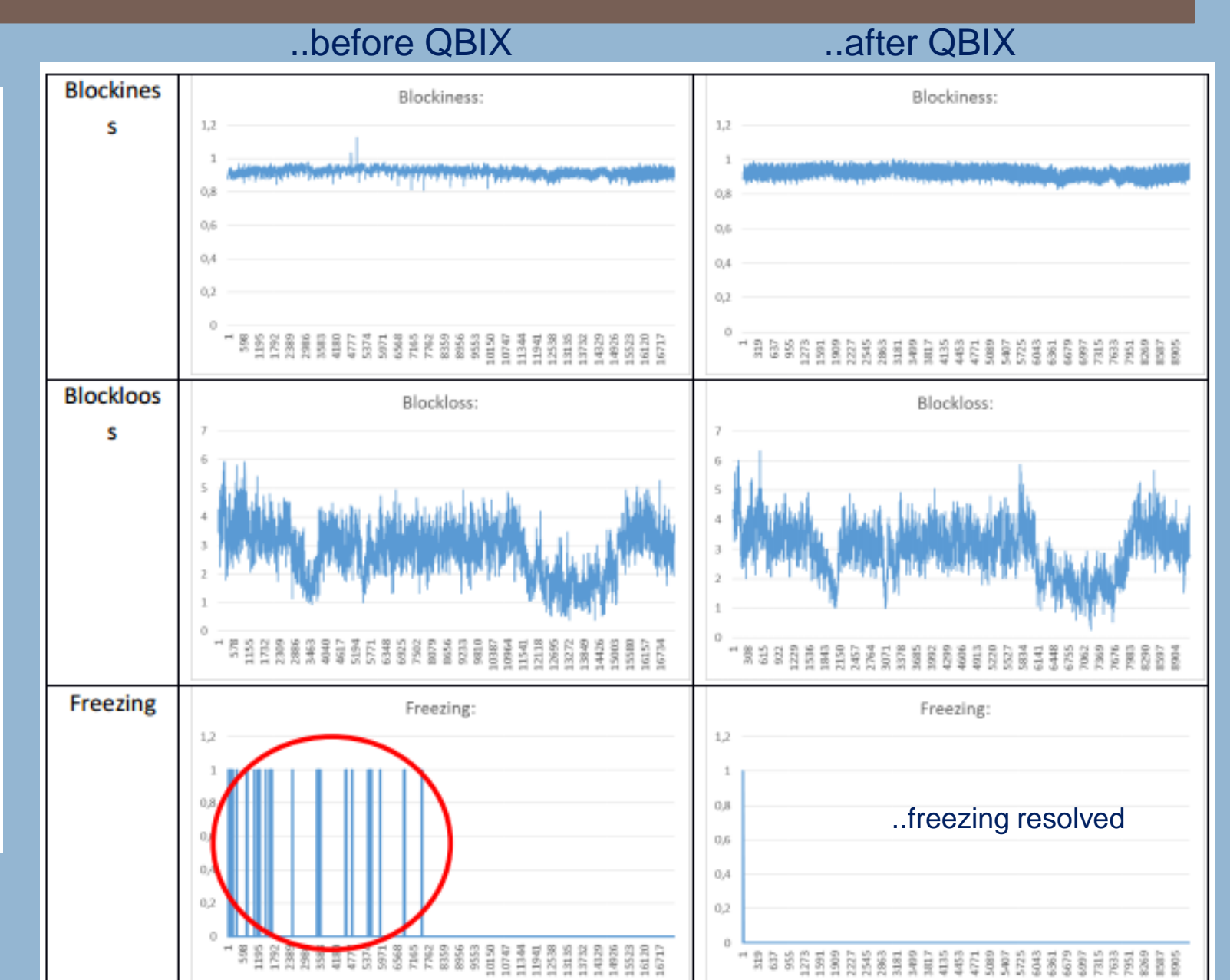
## DEMO SETUP



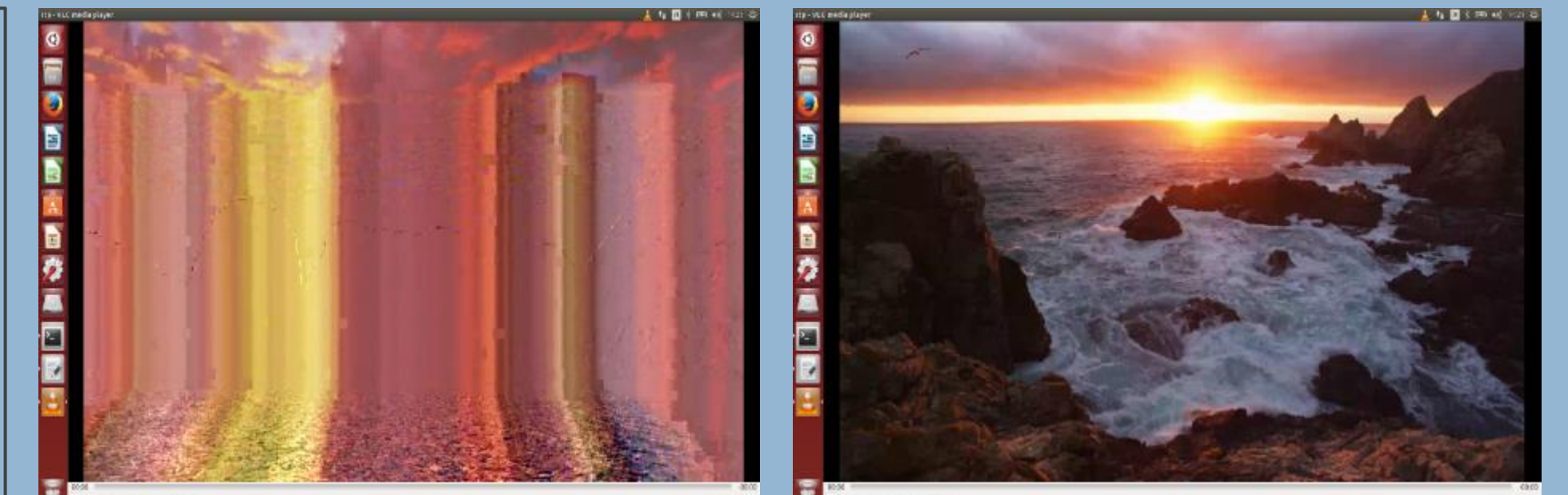
## RESULTS

Table 1: Results of 1Mbit/s test

	Original Video	Tests prior to Fed4FIRE	NITOS
	1Mb/s	1Mb/s	1Mb/s
Blockiness	0,881	0,804574	0,813223
Blockloss	4,889	2,655396	2,798244
Freezing	0	2,321948	2,798244
Spatial Activ	86,99645	81,48463	84,17189
Letterbox	0	0	0
Pillarbox	0	0	0
Blur	2,655396	2,737987	2,798244
Temporal Activ	2,190872	2,321948	1,723075
Blackout	0	0	0
Exposure	113,2868	113,4198	113,4198
Contrast	71,61033	72,47405	71,5109



Metrics used were developed by AGH University [1] and are available to download from <http://vq.kt.agh.edu.pl/metrics.html>



## MORE RESULTS

Table 4: Ideal Values for each o metrics used

	Ideal value
Blackout	0
Blockiness	From 0.9 to 1.01
Block Loss	From 0 to 5
Blur	From 0 to 5
Contrast	From 45 to 55
Exposure	From 115 to 125
Flickering	For time window with a length of 8 frames typical value is around 0.125
Freezing	0
Interlacing	0
Letter-boxing	0
Noise	From 0 to 3.5
Pillar-boxing	0
Slicing	= 0
Spatial Activity	From 0 to 60
Temporal Activity	From 0 to 20

QoE Metric (highest difference only)	Test1	Test2	Test3
	Rate = 2Mb/s		
Blockloss			
Freezing			
SA			
TA			
Flickering			

Test1 Single stream 1Mb/s

Protocol	Blockiness	Blockloss	Freeze
TCP-C	0,88	2,479	0
TCP-D	0,878	2,639	0,043
UDP-C	0,876	2,467	0
UDP-D	0,879	2,549	0,044

Test2 Single stream 2Mb/s

Protocol	Blockiness	Blockloss	Freeze
TCP-C	0,818	1,307	0
TCP-D	0,817	1,752	0,183
UDP-C	0,818	1,395	0
UDP-D	0,801	3,599	0,023

QoE Metric	Stationary (LTE)	Mobile (with background traffic in a role of channel dynamics)
Freezing		
Pillar box		
TA		
Flickering		

## CONCLUSIONS

Thanks to experiments we conducted within testbed we:

- were able to gain insights and acknowledge the role of Fed4FIRE testbeds in development and/or improvement of our products and services
- verified that Fed4FIRE can be valuable for remote collaboration opportunities of our testers and developers (it worked as single stop shop for the development, tuning and reconfiguration of the solution, available 24/7)
- able to gather valuable insights for further tuning the QBIX controller
- have identified new means for performing scalability tests without hassle of necessary HW configurations and time consuming tests (time & cost savings)
- verified the influence of network configuration (e.g. BS parameters / statistics) on the QBIX controller performance – not possible without access to dedicated testbed
- were able to identify some performance flaws of our solution and its sources
- were able to check possibilities of integrating QBIX with LTE networks
- were able to test behavior of our solution with high end equipment

## POST MORTEM

- Experiment allowed for a development of several extensions for MediStream – ITTi's telecare product
- Possible further extensions for video controller to better suit other profitable markets (security or autonomous cars)
- Testbeds provides great asset for any SME interested into comprehensive testing and evolvments of their tools and services
- Literature:

[1] Mu, M., Romaniak, P., Mauthe, A. et al. Multimed Tools Appl (2012) 61: 787. doi:10.1007/s11042-011-0946-3