

# MASCOT MU-MIMO Testbed PSC Meeting Report Sep. 2007

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# MASCOT MU-MIMO testbed development roadmap

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Setup  
(2006)

- Build up hardware infrastructure
- MAC infrastructure and PHY/MAC integration

Testbed extensions  
(2007)

- Basic MU-MIMO MAC implementation
- Demonstration of MU-MIMO system

Measurements  
(2008)

- Implementation of MU-MIMO algorithms
  - MU-MIMO measurement campaign
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# Testbed status: summary

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## Real-time MU-MIMO testbed

- Implementation is delayed
- Main difficulties causing this delay
  - Porting of the PHY to the new hardware platform
  - Implementation and performance optimization of the MAC hardware subsystem was underestimated
- Most fundamental difficulties have been resolved
- Goal of having a stable platform and a basic demonstration by end of 2007 can still be met

## Offline MU-MIMO testbed

- Implementation according to schedule

## Deliverable D2.3.1 (Dec. 2007)

- Defines MU-MIMO algorithms and implementation and demonstration goals for 2008
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# Testbed status: Non real-time MIMO testbed and demonstration

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- Responsible: Michael Lerjen

Task description	Planned	Status	Expected
Design of FPGA platform		COMPLETE	
Replication of FPGA platform	1.6.2007	COMPLETE	
MATLAB interface implementation	15.7.2007	COMPLETE	
Implementation of <b>STBC demonstration</b>	1.7.2007	In progress (delayed)	1.11.2007
Implementation of <b>MIMO-ARQ demo</b>	N.A.	Not started	7.12.2007
MASCOT openhouse	Jan. 2008		Jan. 2008
Measurements	2007	Not started	2008
Relaying testbed	2008	Not started	

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# Testbed status: Real-time MIMO testbed and demonstration

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- Responsible: M Wenk, P. Lüthi, and D. Wagner

Task description	Planned	Status	Expected
MAC HW infrastructure		COMPLETE	
PHY/MAC integration		COMPLETE	
Initial MAC tests (cabled)		COMPLETE	
Baseband/RF integration		In progress	
Design of new HW platform	1.6.2007	COMPLETE	
Basic MU-MIMO MAC SW		In progress	
Over-the-air demonstration	31.7.2008	In progress	15.11.2008
MASCOT openhouse	Jan. 2008		Jan. 2008
Implementation of MU-MIMO algorithms	1.8.2008		
Measurements	31.12.2008		

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# MASCOT openhouse demonstration goals

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## Non real-time MIMO testbed

- Demonstration of over-the-air transmission of STBCs (Golden code, Alamouti code, ETHZ MU-MIMO STBCs)
- Optional: Demonstration of MIMO-ARQ

## Real-time MU-MIMO testbed

- One access point and 2-4 terminals working as a transparent Ethernet bridge
  - Basic MAC protocol, time permitting with CSI feedback and link-adaptation
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# Real-time MU-MIMO testbed MAC protocol overview

## Requirements

- Fast retransmissions
- Relaxed real-time (latency) constraints
- Allow for collisions among users
- Allow for CSI feedback
- Minimize guard periods and idle times
- Simple protocol to ease real-time software implementation

## MU-MIMO MAC Protocol

- Centralized arbiter: all transmissions are scheduled by the AP
- ACK from STA may include uplink data and CSI feedback
- ACK from AP may include data or query for any STA

