NCETIS
National Center of Excellence in Technology for Internal Security

National Center for Excellence in Technology for Internal Security (NCETIS)

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Internal Security Issues

- Urban Terrorism and LWE Problems
  - Several bomb blasts
  - Terrorists using state of the art technologies
- The Policing
  - Multidimensional involving intelligence and technology integration
  - Forensic investigation, evidence management and evidence authentication
- Internet and Social Media
  - Internet telephony and Voice over IP by perpetrators of crimes
- Public Safety Disaster Recovery and Emergency Response
- Cyber and Economic Crimes

Prelude

- IIT Bombay has also been conducting CEP courses for IPS officers for past 10 years
- Concept note submitted to DeitY in 2012
- NCETIS Workshop with stake holders- 27th July 2013
  - A proposal submitted to DeitY for funding
- Meeting with Stakeholders Organized by DeitY– 23rd January 2014
- Submitted Detailed Project Report (DPR) to DeitY – 25th March 2014
- SFC Meeting – 9th December 2014
- Approval for the Center – 29th May 2015

Motivation

- Leverage the existing expertise in IIT Bombay
- Focused approach on developing technology for security forces
  - Use of technology improves intelligence gathering, crime detection and law enforcemenet
  - Technology for forensic investigation
- Technology for Homeland Security-- an upcoming focus research field
  - IEEE Conference on Technologies for Homeland security http://ieee-hst.org/

Scope of the Center

- National Center focusing on the needs of internal security
- Coordinate with other institutes and labs in the country
- Strong engagement with industry
- Target towards self sufficiency in the area of ESDM for strategic sector

Homeland Security Centers in US and UK

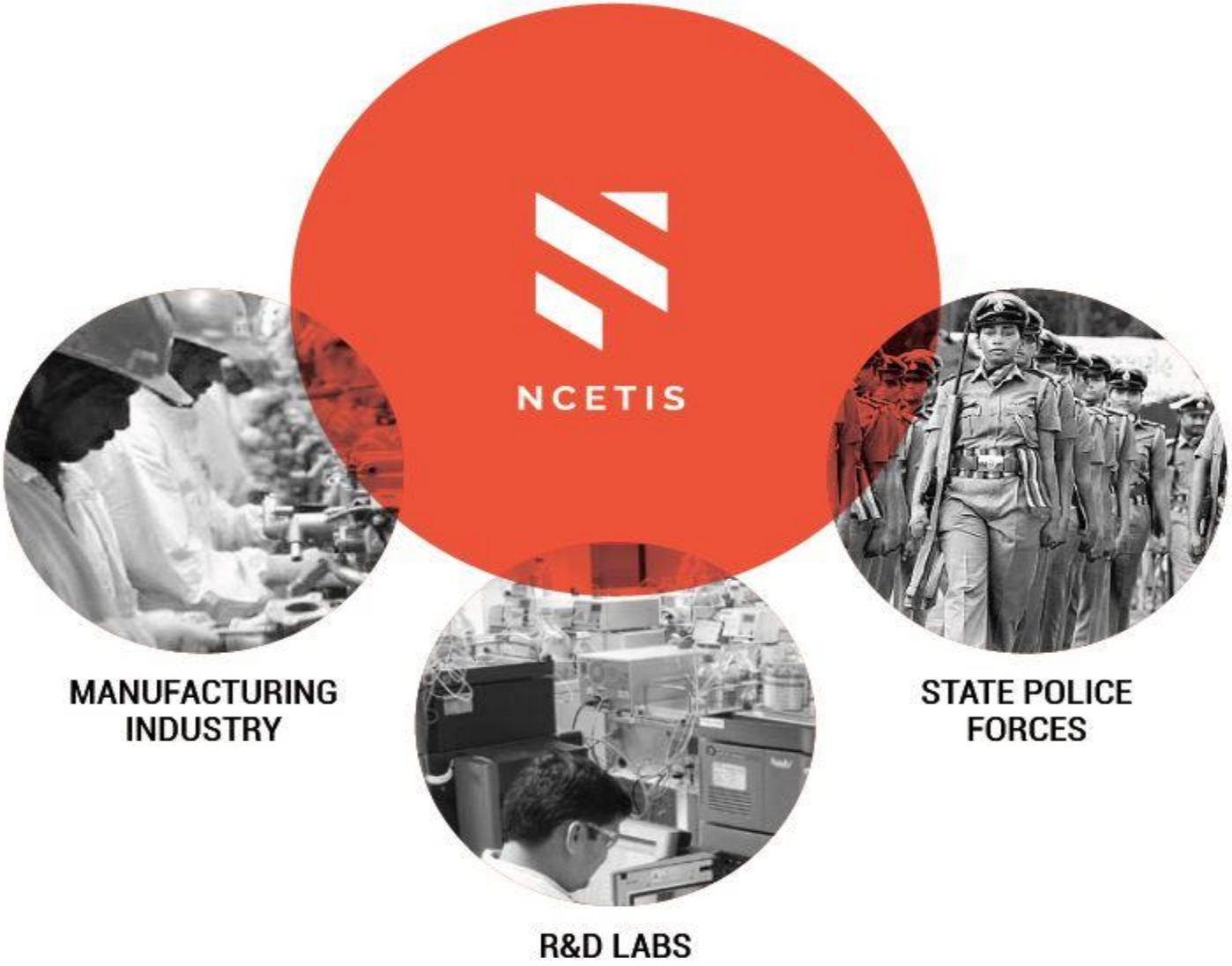
- Center of Excellence in Security and Cybercrime, Scotland, UK. http://www.sfc.ac.uk/web/FILES/CMP_InvestmentCommittee2July2010_02072010/IC_10_46_Centre_of_Excellence_in_Security_and_Cybercrime.pdf

- Department of Homeland Security Centers of Excellence, USA. http://www.dhs.gov/files/programs/editorial_0498.shtm

Objectives of NCETIS

- To undertake research to address the technology innovation gaps for security
  - Short term, long term and medium term
- To transform the research outcomes into prototypes and facilitate technology transfer for product development – **engage with Indian industry for strategic needs**
- To undertake research related to regulatory issues
- To undertake consulting and advisory services for security forces about technology choices
- To undertake training activities for technology appreciation
- To serve as a resource center for state police forces to help them with various challenges
- To act as nodal agency to provide technology assistance at all levels to central and state police forces and other policing agencies

Concept of the center



NCETIS
Indian Institute of Technology, Bombay

Steering Committee Structure

1. Director IIT Bombay (Chairman)
2. Secretary, DietY (or Nominee) (Co-Chairman)
3. Dean R&D IIT Bombay
4. Representative of IB
5. JS (IS), MHA
6. JS (Police), MHA
7. Representative of NPA
8. Representative of WPC, DoT
9. Center Coordinating Faculty of IIT Bombay (Member Secretary)
10. Director General of Police (or Nominee), State 1
11. Director General of Police (or Nominee), State 2
12. Director General of Police (or Nominee), State 3
13. Director General of Police (or Nominee), State 4
14. Director General (or Nominee) of CRPF, BSF, ITBP, SSB (one org by rotation)
15. Director General (or Nominee) of NIA, CBI, NCB (one org by rotation)
16. Director General (or Nominee) of BPR&D
17. Director General (or Nominee) of SPG, NSG, CISF (one org by rotation)
18. Chairman of NTRO (or Nominee)
19. Two industry Representatives nominated by DeitY
20. Representative of DRDO
21. Two faculty members from IITB as members

* Members mentioned at 10 to 13 will be chosen annually for the steering committee on rotation basis and as per the progress requirement

Focus Areas of the center

- Wireless Communications System
- Social Networking and Internet
- Video Surveillance and Analysis
- Ground Penetrative Radar (GPR) for Landmine Detection
- Unmanned Vehicles
- Cyber and Data Security
- Biometric Applications
- Sensors and Detectors for Explosives, Landmines, Chemical and Biological Warfare
- Thermal Imaging
- Product Design, Product Interaction Design and Prototyping

Technologies Developed at IIT Bombay

Broadband Wireless for Public Safety Communication

Motivation

- Terror attacks on Indian Parliament in 2001, 26/11 attack at Mumbai in 2008 and various bomb blasts
  - Need for home grown state of the art communications system
- Leverage expertise in 4G/4G+ wireless at IIT Bombay
- Leverage expertise in product design to conceptualize product

Current Public Safety Communication System

- Analog
  - APCO
- Digital
  - APCO 25 (standardized by TIA USA)
  - TETRA (standardized by ETSI Europe)
- Limitations
  - Narrowband wireless system
  - No high quality video or images
  - No high speed data
  - Poor Security

Global Trends

- Other nations transitioning to broadband wireless for public safety
  - State of the art system deployed in urban warfare (NATO operation in Afganistan)
- US National Broadband Plan includes broadband public safety communication as one of the goals
  - http://www.broadband.gov/plan/
- Several trials reported using 4G systems in emergency scenario
  - May 2011 US defense force demonstrated such system during raid on terrorists hidden in Pakistan

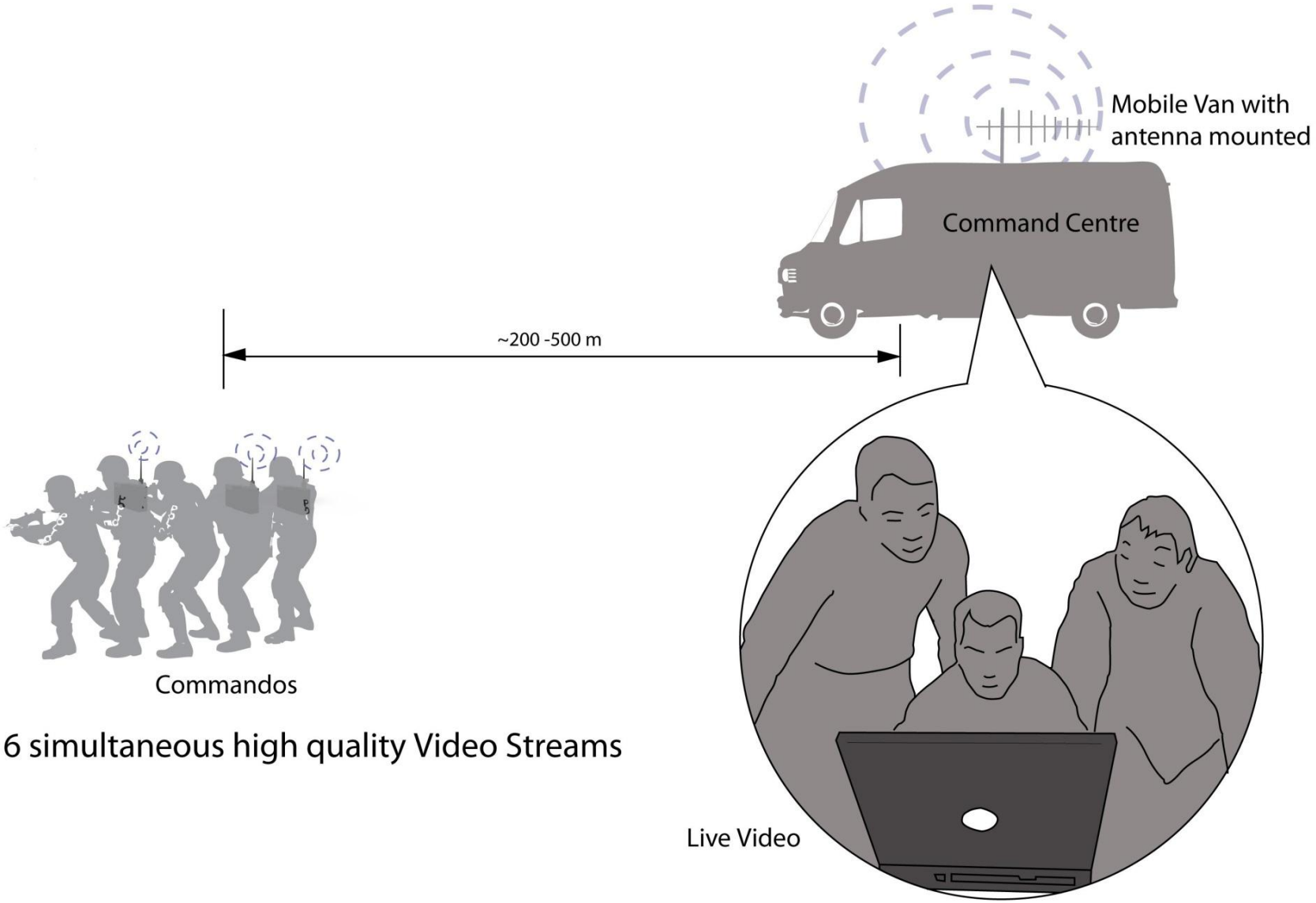
Indian Scenario

- Public Safety & Emergency Communication System critical segment for India
- Current Status
  - No Indian Company developing such products
  - No Indian IPR
- 4G+ based Broadband Public Safety Communication System
  - Fully standards based technology
  - High Capacity
  - We have know how

Summary of Previous Work at IITB

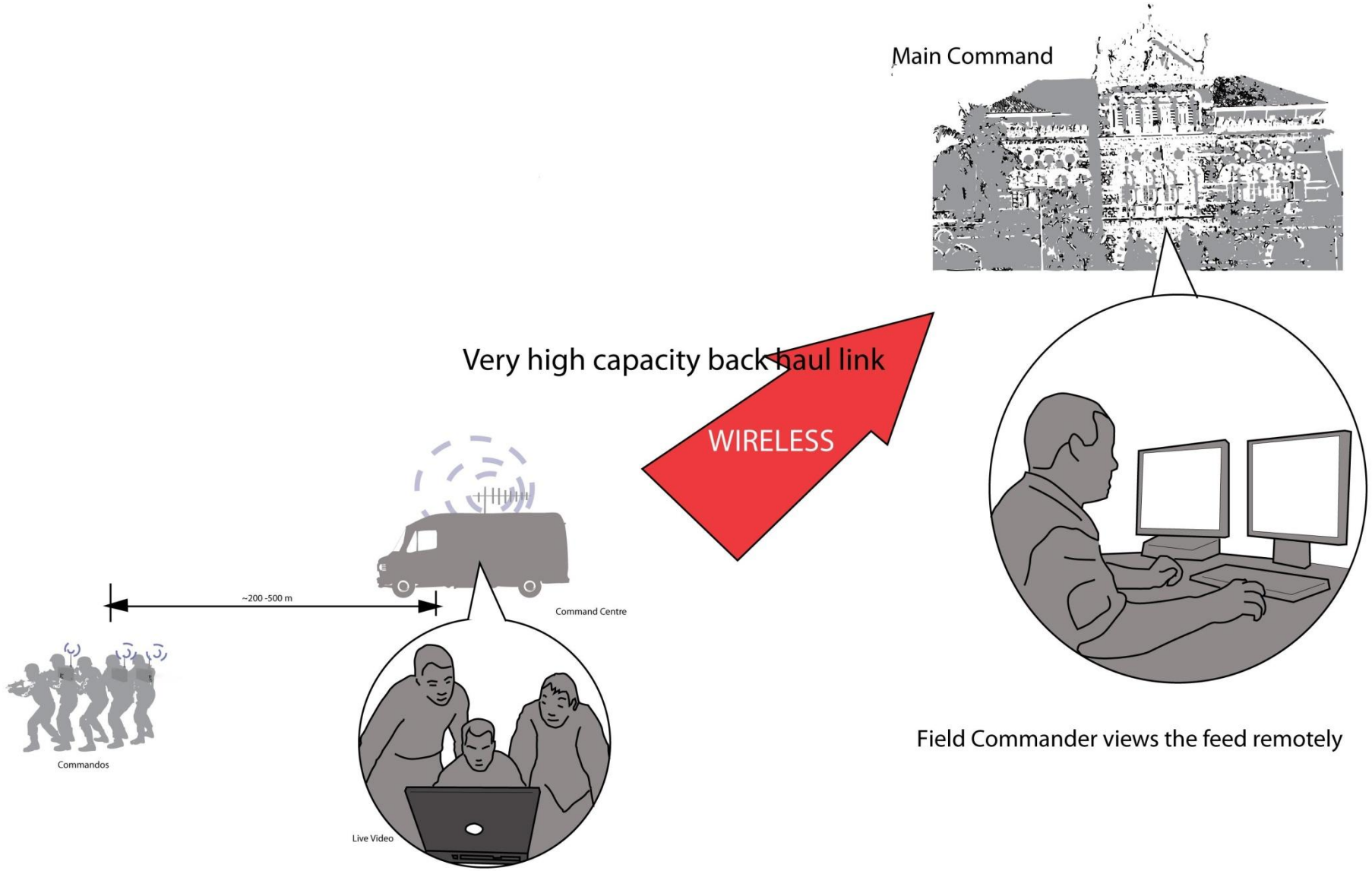
- A prototype base station with 6 Commando units designed, developed and tested
- Innovative MAC protocol with WiFi baseband integrated with 400 MHz RF
- Secure SD quality Video streaming with H-264 encoding
- Ergonomic design
- Archiving of captured video for post event retrieval and analysis

System Overview

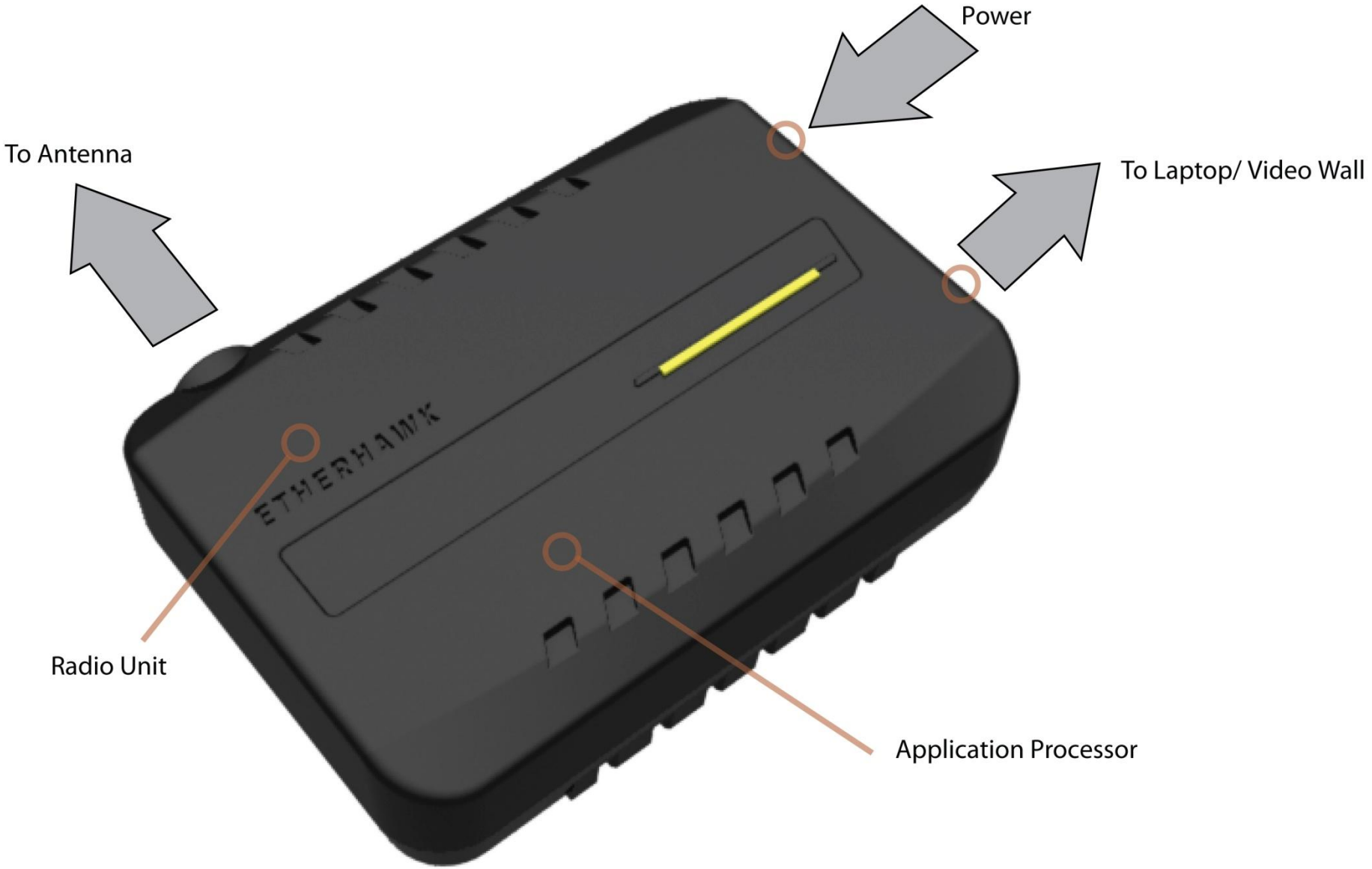


Upto 6 simultaneous high quality Video Streams

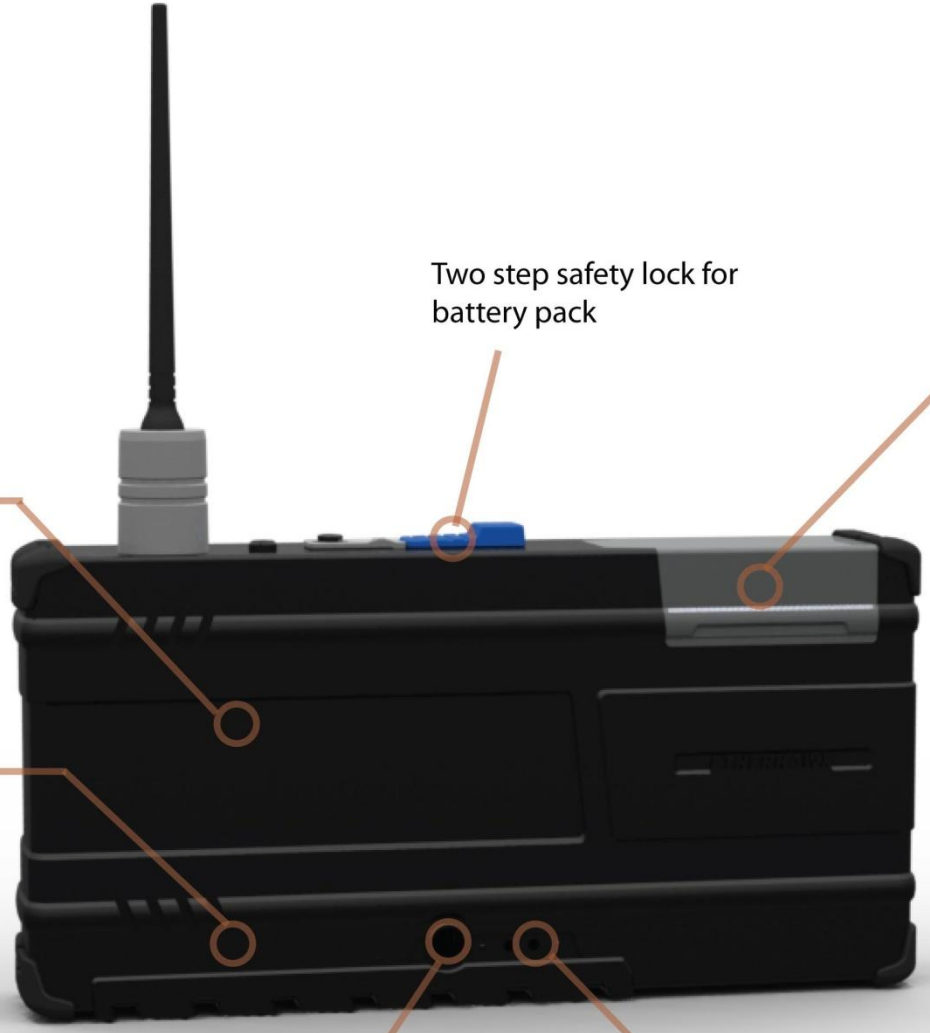
System Overview Using Backhaul



Base Station



Radio Pack



Two step safety lock for battery pack

Swappable battery pack

Heavy Duty Li Polymer with 7 hrs talk(Video) time

Radio unit with video encoder

Controlled remotely from base station

Camera PCB

Audio Mic

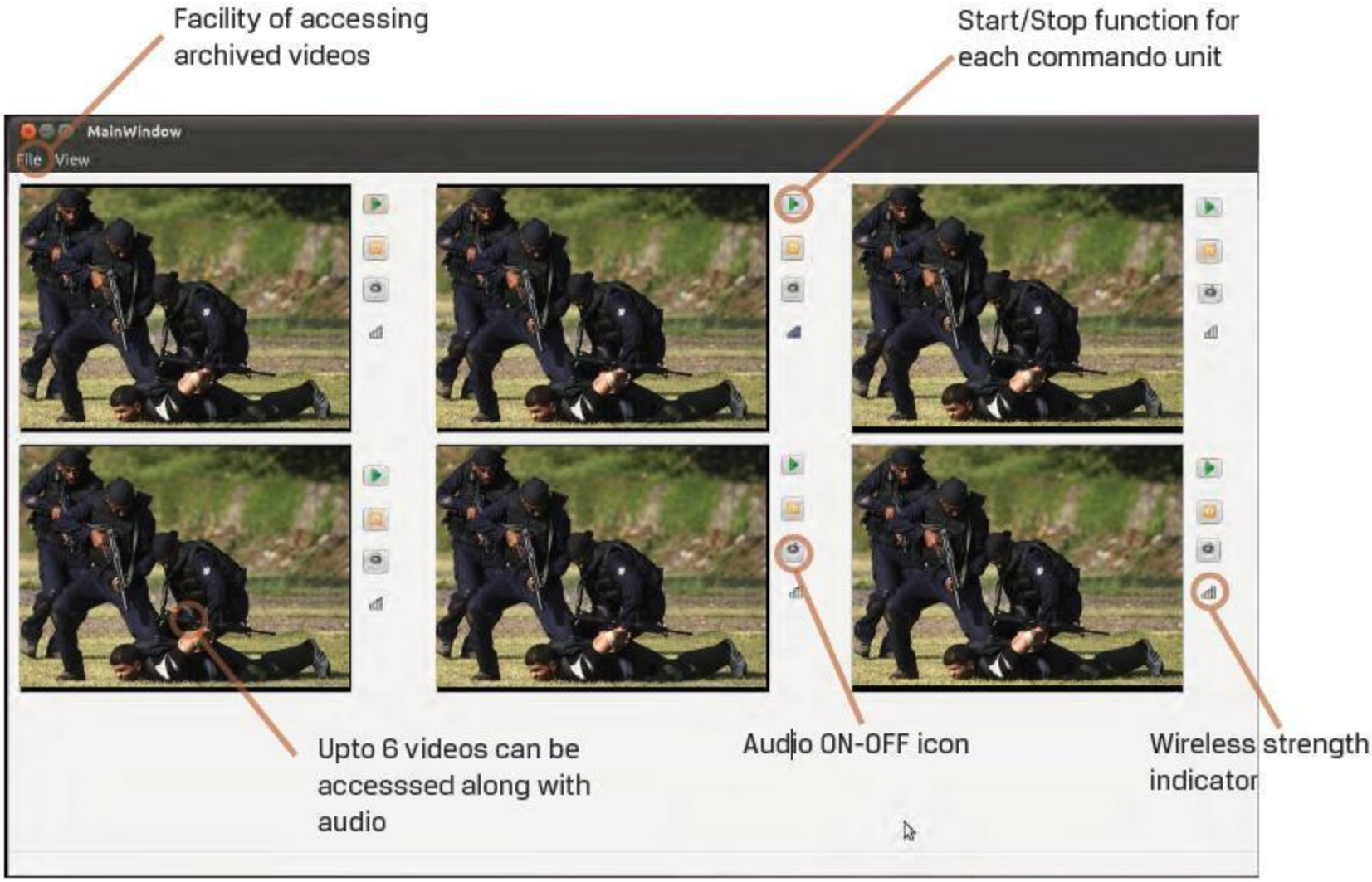
LED system indicators

Product Mounting

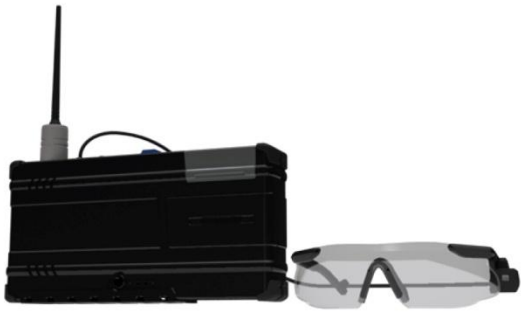
Eye wear


military grade polycarbonate lenses
2 MP wide angle micro camera
wide body eyewear lenses provide high situational unawareness
unobstrusive camera placement

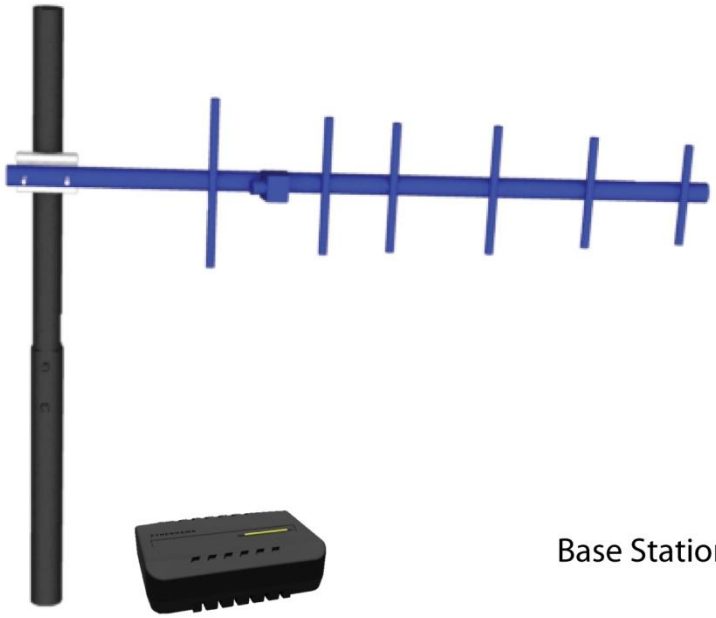
User Interface



System Components



Commando Units



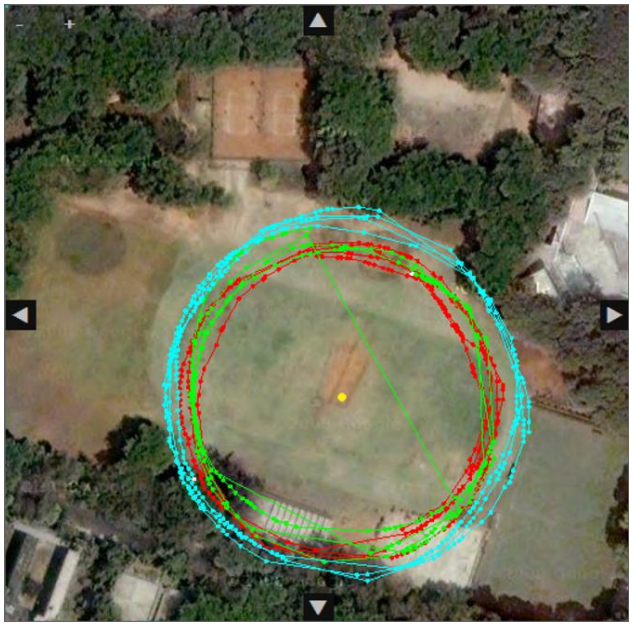
Base Station

Control Server

Technologies Developed at IIT Bombay

Robotics & Autonomous Vehicles

MAV Visiting waypoints



Geo-target localization

3 MAVs in co-operative mission

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Technologies Developed at IIT Bombay

Autonomous Outdoor Ground Vehicles

Technologies Developed at IIT Bombay

Explosive Detector

Technologies Developed at IIT Bombay

Night Vision : Long range surveillance

Ref : http://www.flir.com.

Technologies Developed at IIT Bombay

Handheld Explosive Detector

Detects TNT, RDX, PETN etc. at RT

THANK YOU