

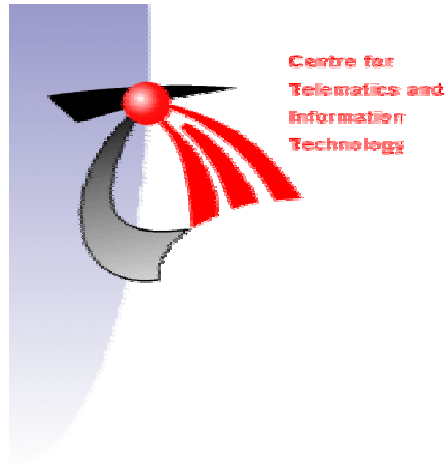


# THE INTERNET NEXT GENERATION PROJECT

**PRESENTATION TO THE BOARD OF THE CTIT**

**8-3-1999**

**UNIVERSITY OF TWENTE, THE NETHERLANDS**



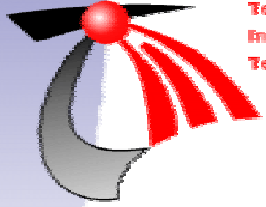
## **KEY FIGURES**

**START: 1-1-1999**

**DURATION: 4 YEARS**

### **PARTNERS:**

- CTIT
- **TELEMATICS INSTITUTE - CENTRAL ORGANIZATION**
  - **ERICSSON BUSINESS MOBILE NETWORKS**
  - **ERICSSON TELECOMMUNICATIONS**
  - **KPN RESEARCH**
- **COSTS PER YEAR: 2 MEURO (CTIT: 1 MEURO)**



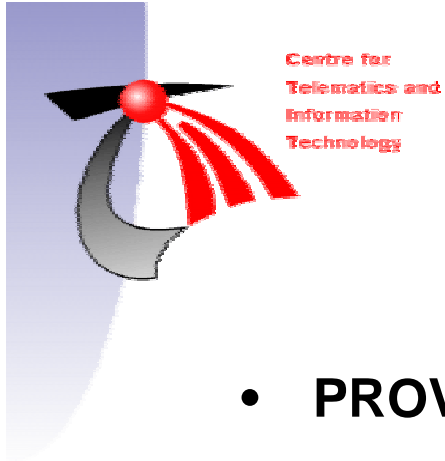
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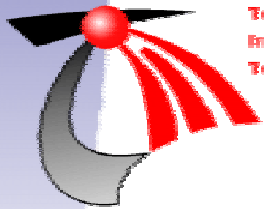
# PROJECT GOALS

- **INCREASE DUTCH CONTRIBUTION TO THE INTERNATIONAL DEVELOPMENT OF NEW INTERNET TECHNOLOGIES**
  - **INTERNET-2, IETF, IRTF**
- **KNOWLEDGE CENTER WITHIN THE NETHERLANDS**
- **WEB SITE(S), TUTORIALS, ONLINE TRAINING MATERIAL, ANTC & ETB**



# RESEARCH SUBJECT

- **PROVISION OF QUALITY OF SERVICE IN THE INTERNET**
  - **IN CORE NETWORKS**
  - **IN ACCESS NETWORKS**
- **INTRODUCE ACCOUNTING**
- **IMPROVE MANAGEMENT ARCHITECTURE**



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# PROJECT STRUCTURE

**WU1**

DISSEMINATION OF RESULTS AND ONLINE TRAINING

**WU3**

QoS IN CORE NETWORKS

**WU4**

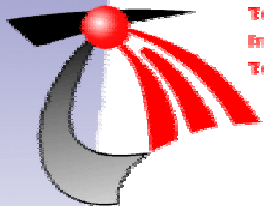
QoS IN WIRELESS NETWORKS

**WU2**

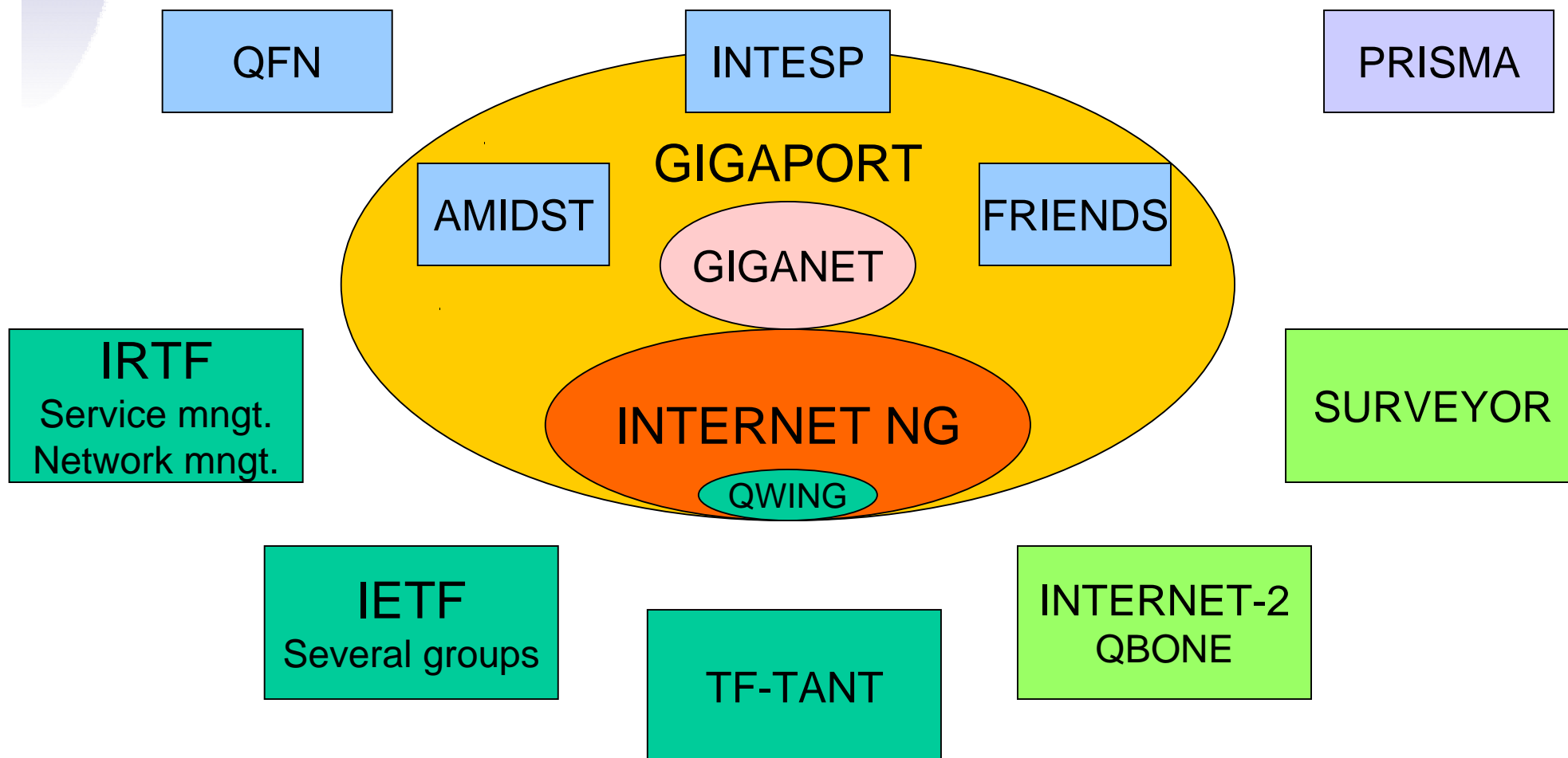
INTERNET MANAGEMENT ARCHITECTURES

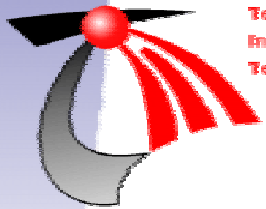
**WU5**

INTERNET ACCOUNTING



# RELATION BETWEEN PROJECTS





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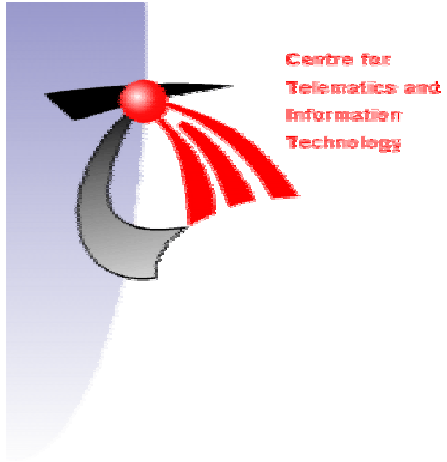
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# PROJECT FINANCE

TI-BASIS FINANCIERING / GIGAPORT

*QWING*

*KPN RESEARCH*



# WORK UNIT 1

## DISSEMINATION AND TRAINING





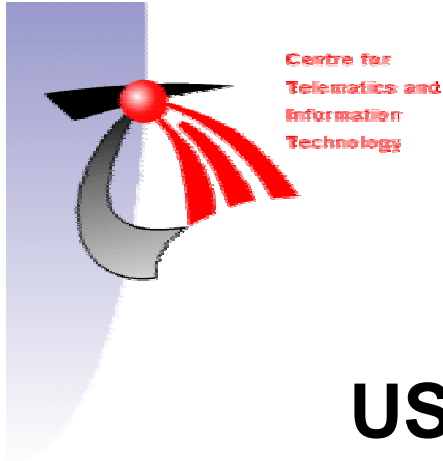
# DELIVERABLES WU 1

## WEB SITE WITH INTERNET MANAGEMENT INFORMATION

### TUTORIALS ON:

- IPv6
- SNMPv3
- DISTRIBUTED MANAGEMENT
  - INTSERV AND DIFFSERV
  - MOBILE NETWORKING

## TRAINING MODULE ON INTERNET MANAGEMENT



## **WU1 APPROACH**

### **USE ADVANCED MODULES OF TGS:**

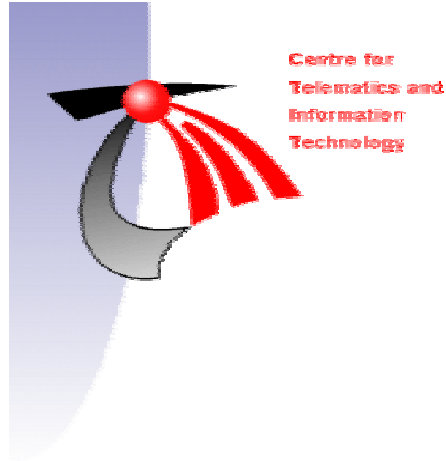
- **INTSERV, DIFFSERV, IPv6**
- **MOBILE NETWORKS**
- **INTERNET MANAGEMENT PROTOCOLS**

**INVESTIGATE POSSIBLE EMBEDDING WITHIN EUNICE**



## **WORK UNIT 2**

# **NEW INTERNET MANAGEMENT ARCHITECTURES**



# **WU2 DELIVERABLES**

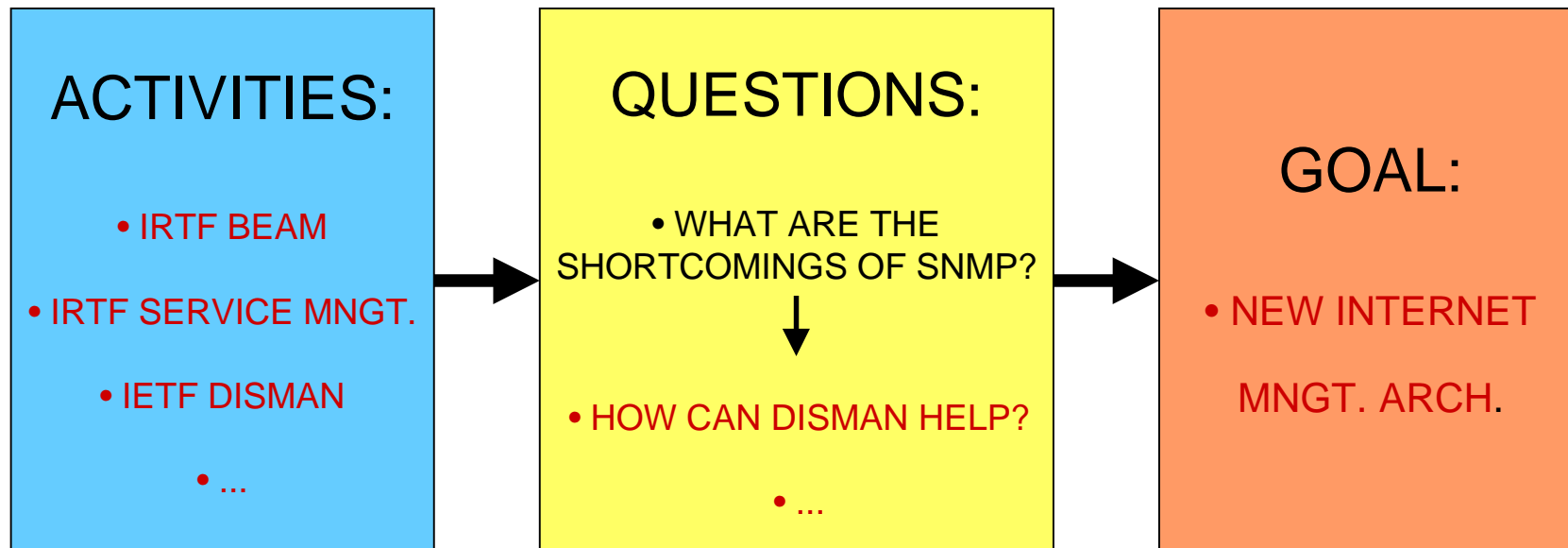
**31-10-1999: D2.1**

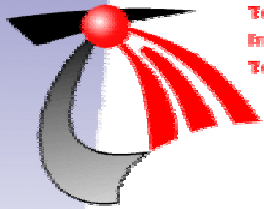
**HOW TO TRANSFER LARGE AMOUNTS  
OF MANAGEMENT DATA RELIABLY**

**31-12-1999: D2.2**

**INITIAL SERVICE MANAGEMENT ARCHITECTURE**

## WU2 Approach



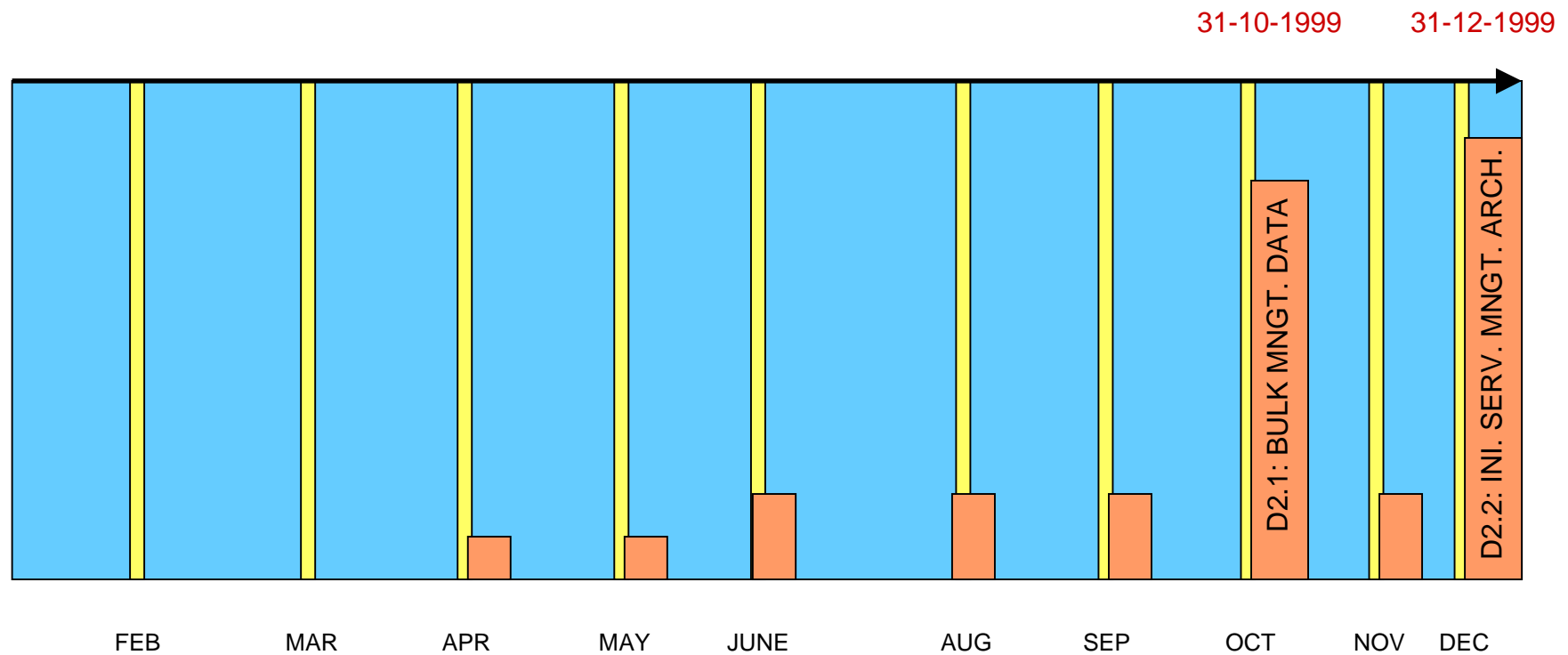


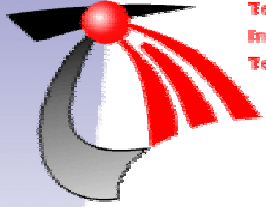
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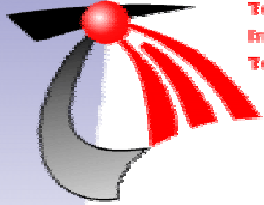
# GOAL, QUESTIONS & ACTIVITIES





## SHORTCOMINGS OF SNMP

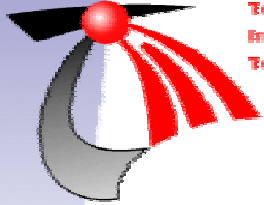
- LIMITED SCALABILITY
- NO SPECIAL MEANS FOR INTER-OPERATOR MANAGEMENT
  - DIFFICULT TO USE FOR END USERS (CNM)
  - ...



# QUESTIONS

- **WHAT ASPECTS OF EXISTING MANAGEMENT ARCHITECTURES MAY BE RELEVANT FOR THE FUTURE INTERNET MANAGEMENT ARCHITECTURE?**
  - **WILL SNMP REMAIN IMPORTANT?**
- **CAN DISMAN HELP TO SOLVE THE SCALEABILITY PROBLEM? HOW?**
- **WHAT ARE THE MAIN PROBLEMS FOR INTER-OPERATOR MANAGEMENT**
- **CAN WE USE TMN IDEAS TO SOLVE INTER-OPERATOR MANAGEMENT? HOW?**
- **IS SNMP A GOOD SOLUTION TO TRANSFER LARGE AMOUNTS OF MANAGEMENT DATA? WHY (NOT)?**
  - **CAN XML HELP TO TRANSFER LARGE AMOUNTS OF MANAGEMENT DATA?**
- **WHAT ARE THE MAIN PROBLEMS FOR CUSTOMER NETWORK MANAGEMENT?**





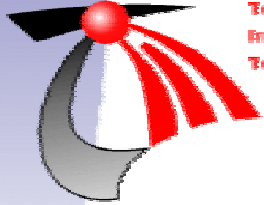
# ACTIVITIES

- **DEFINE TERMINOLGY (E.G. ELEMENT, DEVICE, NETWORK, PROTOCOL, APPLICATION, SERVICE, CUSTOMER & BUSINESS MANAGEMENT)**
- **STUDY STATE OF THE ART (E.G. SNMPv3, DISMAN, TMN, ISO, OMG/CORBA, W3C/XML)**
  - **PARTICIPATE IN IRTF SERVICE MANAGEMENT GROUP**
  - **PARTICIPATE IN IRTF NETWORK MANAGEMENT GROUP**
    - **PARTICIPATE IN IETF DISMAN GROUP**
  - **EXPERIMENT WITH DISMAN IMPLEMENTATIONS**
  - ...



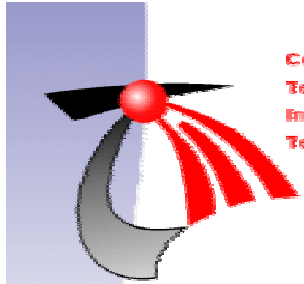
## **WORK UNIT 4**

# **QoS OVER WIRELESS AND MOBILE ACCESS NETWORKS**

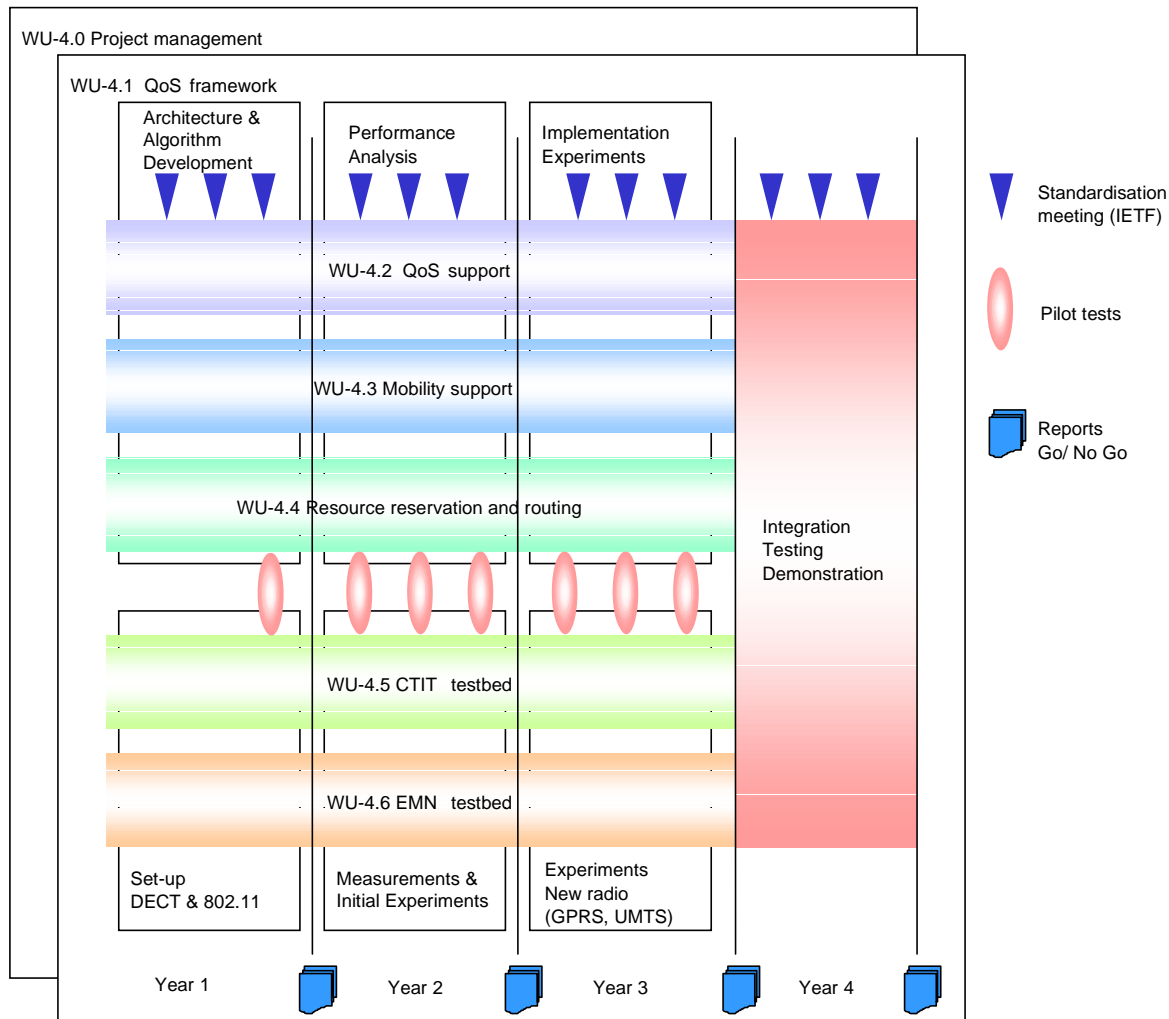


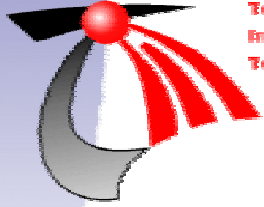
## **WU4 DELIVERABLES**

- **A FRAMEWORK FOR QoS SUPPORT FOR IP NETWORKS WITH WIRELESS AND MOBILE ACCESS NETWORKS**
- **A DESCRIPTION OF QoS SUPPORT BY WIRELESS NETWORKS**
- **A DESCRIPTION OF MOBILITY SUPPORT IN WIRELESS NETWORKS**
  - **A DESCRIPTION OF RESOURCE RESERVATION AND ROUTING ALGORITHMS IN IP NETWORKS WITH MOBILITY**
    - **WIRELESS TESTBED IN ANTC**
    - **WIRELESS TESTBED AT ERICSSON**



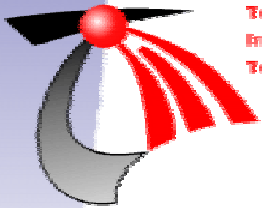
# WU4 Global Planning



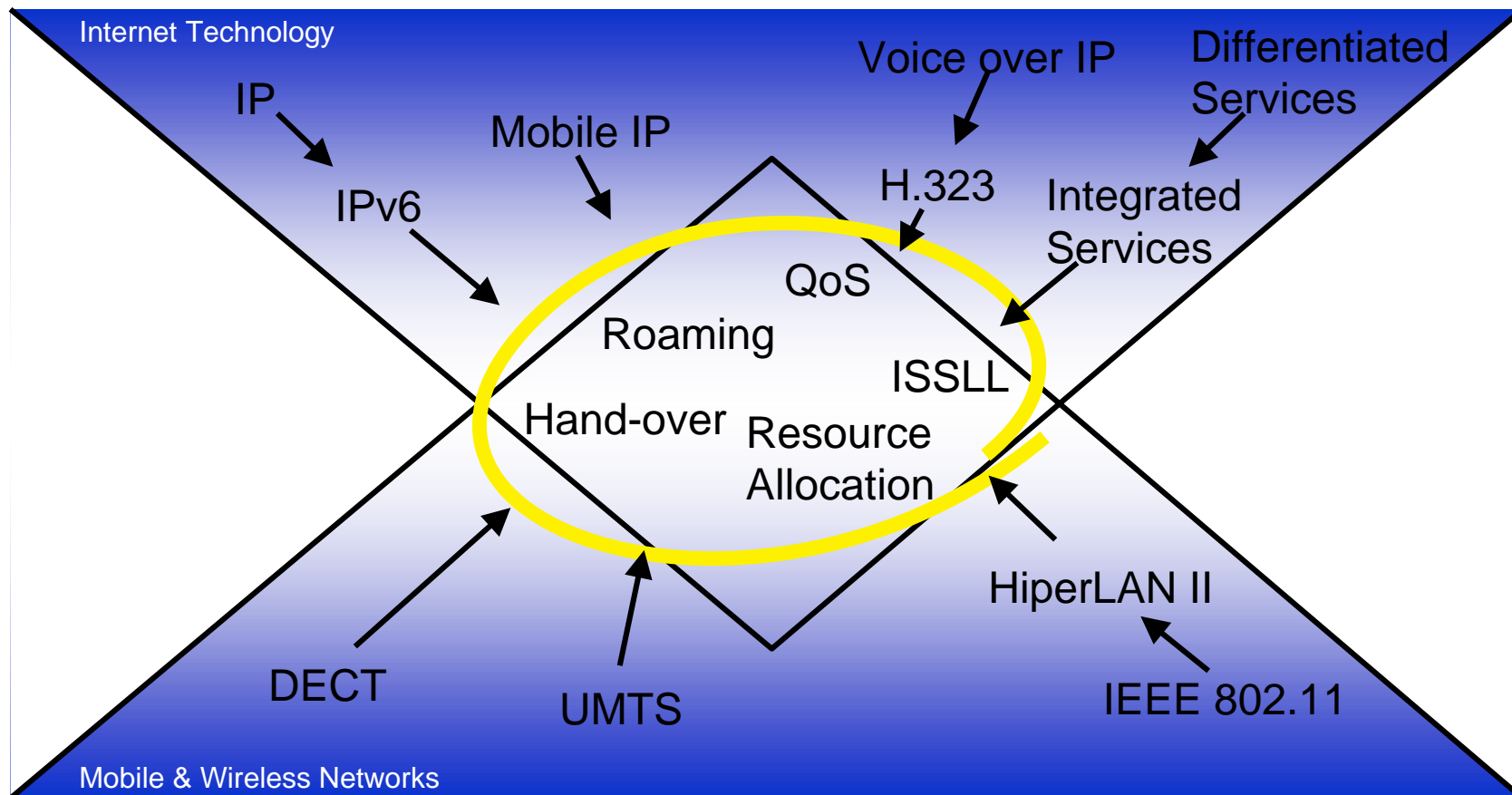


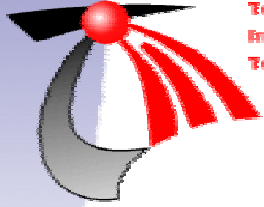
## Key Issues

- **Extension of Integrated Services and Differentiated Services Frameworks with the notion of QoS and mobility in wireless networks**
- **The use of mechanisms and protocols (e.g., RSVP) for service differentiation over wireless link layers**
  - **The support of various wireless networks for QoS requirements and ability to differentiate between QoS classes**
- **Location management and handover algorithms to support real-time IP services in wireless networks**
- **Combined resource reservation and routing for high network efficiency, QoS support, and mobility support**



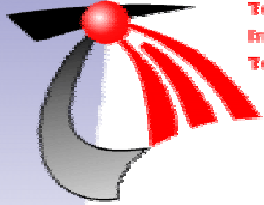
# Relevant Technologies





# ACTIVITIES

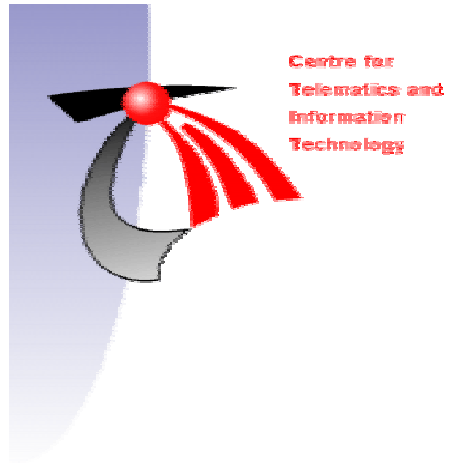
- Framework development
- Evaluation and comparison of DECT, IEEE 802.11, HiperLAN II, and UMTS (W-CDMA / TD-CDMA)
  - Design of schemes for QoS (re-)negotiation, admission control, resource allocation, and scheduling for a wireless subnetwork
- Design of schemes for location management and hand-over suitable for real-time services on wireless networks
  - Design of schemes for per flow reservation in DiffServ domains with reservation for aggregated traffic
  - Design of schemes for admission control and resource reservation in the presence of mobility, and optimization of routing



## **ACTIVITIES (CONT'D)**

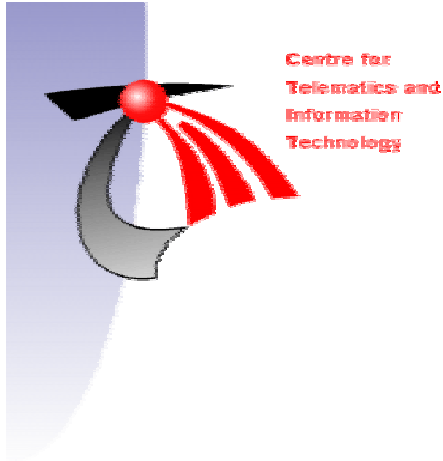
- **ANTC Testbed setup using existing IEEE 802.11 equipment**
- **Modification of DECT hardware and software for use in a IP environment**
- **EMN Testbed setup using existing IEEE 802.11 equipment, and modified DECT equipment**
- **Measurement and modeling of IP level performance of DECT and IEEE 802.11**
- **Experiments on (IP level) performance requirements and traffic load of mobile / wireless applications**
  - **Initial performance analyses**





# WORK UNIT 5

## INTERNET ACCOUNTING



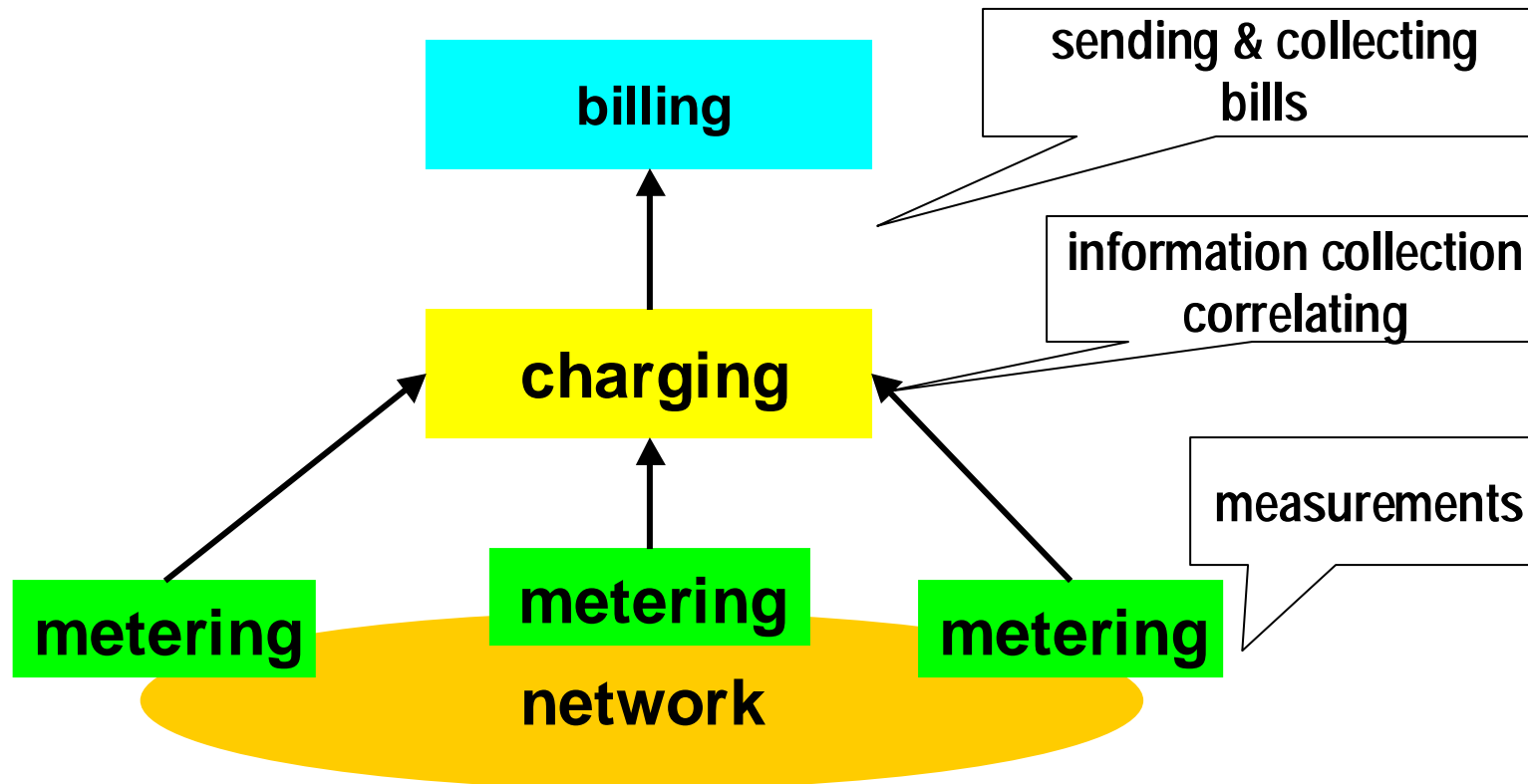
# **DELIVERABLES**

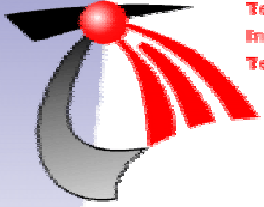
**D5.1: STATE OF THE ART REPORT  
ON ACCOUNTING**

**D5.2: INITIAL INTERNET ACCOUNTING  
ARCHITECTURE**

**D 5.3: REPORT ON POSSIBLE TECHNIQUES FOR  
METERING**

# WHAT IS ACCOUNTING?

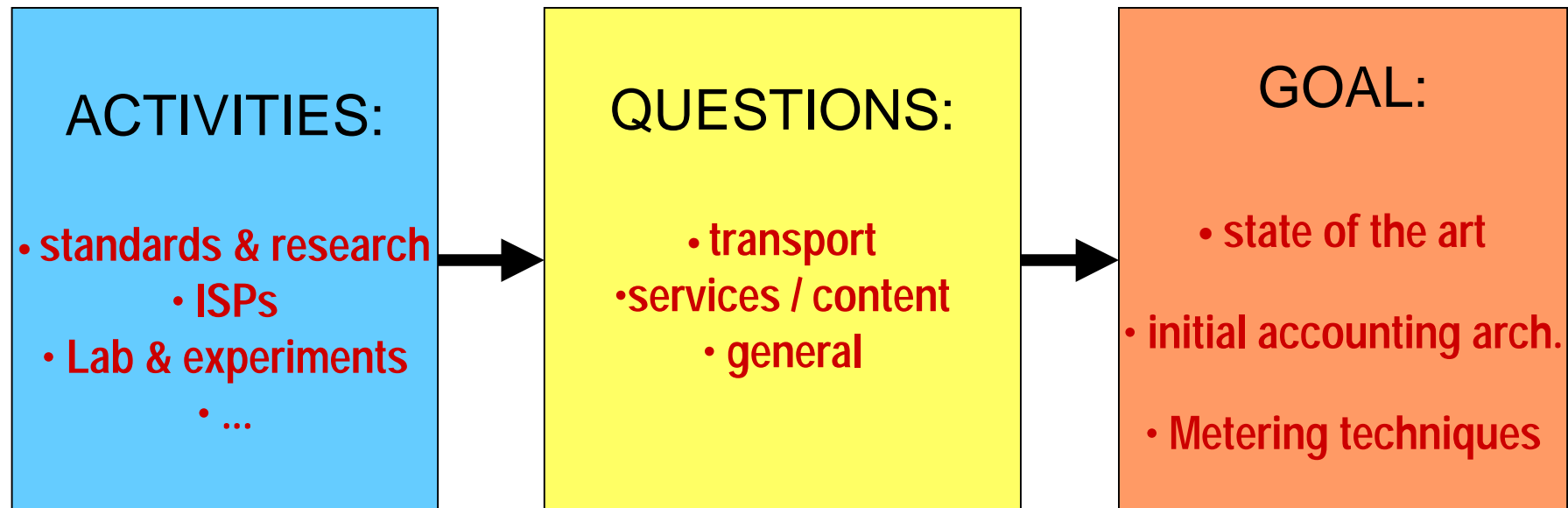


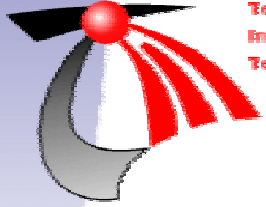


## WHY ACCOUNTING?

- **Internet NG  $\Rightarrow$  QoS  $\Rightarrow$  Accounting**
  - **a way to influence user-behavior**
- **it is the ultimate user-provider relation**
  - **allows for product differentiation**
- **access networks are scarce resources**
  - **providers want accounting !?**

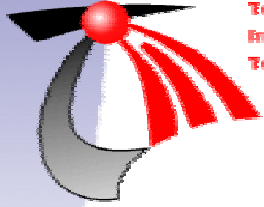
# APPROACH





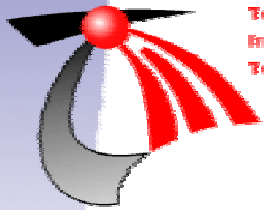
## QUESTIONS - TRANSPORT

- **Can you make a difference between local, national and international traffic**
- **Can you distinguish inter and intra traffic**
  - **can you do accounting when e.g. retransmissions are involved**
  - **what information is needed for accounting**
- **what is the influence of future developments**
  - **...**



## QUESTIONS - GENERAL

- **What's the difference between accounting in the 'old' and 'new' world**
- **who are involved in the accounting process and how will it be 'organized'**
- **what accounting information needs to be exchanged between ISPs/operators**
  - **At what level(s) is accounting possible/needed (user or aggregates)**
  - **...**



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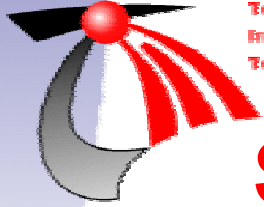


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## ACTIVITIES

- **State-of-the-art standards (IETF, TINA, IRTF)**
- **state-of-the-art research (publications, conferences)**
- **Interviews Internet Service Providers**
- **Accounting parameters used by ISPs.**
- **Influence of politics and regulations.**
- **Accounting lab, prototypes and experiments.**
- **Insight in Traffic Flows.**
- **Study new technologies and equipment (e.g. Mobility, DIFFSERV, INTSERV).**
- **Homepage.**





# SOURCES FOR STATE OF THE ART

## Standards

- IETF:
  - ATM accounting
  - RTFM
  - AAA
  - NASREQ
- TINA
- Eurescom
- ETSI
- ...

## Projects

- ACTS:
  - CA\$HMAN
  - CANCAN

## Reports & products

- Bellcore
- ...
- Cisco
- ...