

NICT T&F Training Program 2009
Introduction



- Participants
- Introduction of NICT
- Space-Time Standards Group
- NICT T&F Training Program
 - Purpose
 - Schedule
 - Requests and Suggestions

1. Kejia ZHAO : National Institute of Metrology (China)
2. Marat KONKANOV : Kazakhstan Institute of Metrology (Kazakhstan)
3. A. Mohamad BOYNAWAN : Indonesian Institute of Sciences (Indonesia)
4. Thayathip THONGTAN : National Institute of Metrology Thailand (Thai)
5. Victor V. GABI : National Institute of Standards and Industrial Technology (Papua New Guinea)
6. Roland T. TAGIS : National Institute of Standards and Industrial Technology (Papua New Guinea)
7. Sanjaya A. PERERA : Department of Measurement Units, Standards and Service (Sri Lanka)
8. Hong ZHANG : National Time Service Center, Chinese Academy of Science (China)
9. Samir Al ZAHER : National Standards & Calibration Laboratory (Syria)
10. Belal Abo Adas : National Standards & Calibration Laboratory (Syria)
11. Sabino Paulo B. LEONES Jr. : National Metrology Laboratory, Industrial Technology Development Institute (Philippines)
12. Yanying LIU : National Metrology Centre, A*STAR (Singapore)

Mission

NICT ~~NICT~~

As the sole national research institute in the information and communications field, NICT will strive to advance the technologies and contribute to national policies in the field, by promoting our own research and development and by cooperating with and supporting outside parties.

Functions

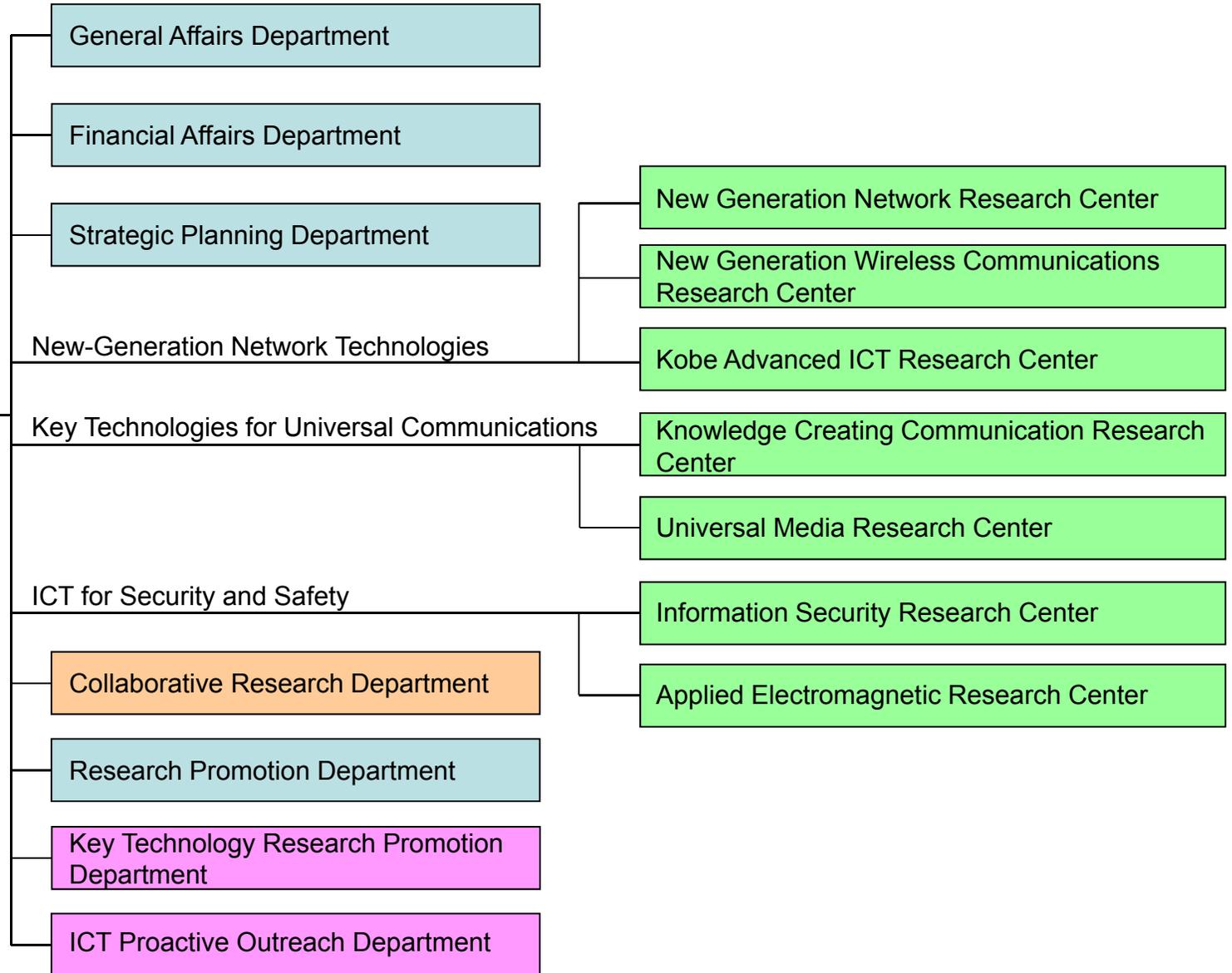
- R&D of technology relating to the information and communications technology (ICT) and radio waves
- Support for those conducting R&D in advanced telecommunication and broadcasting
- Promotion of enterprises within the telecommunication and broadcasting area

NICT Organizational Chart



President

Dr. Miyahara



New Generation Network Research Center

Executive Director (Mizuhiko Hosokawa)

- Network Architecture Group
- Photonic Network Group
- Quantum ICT Group
- Advanced Device Research Group
- **Space-Time Standards Group**

Space-Time Standards Group

Group Leader (Yasuhiro Koyama)

— **Japan Standard Time Project**

Generating and Keeping JST and UTC(NICT)
Dissemination and Calibration
Time Related Business Applications

— **Atomic Frequency Standards Project**

Primary Frequency Standards
Optical Frequency Standards

— **Space-Time Measurement Project**

Time and Frequency Transfer
Spatial Reference Frame

— **Satellite Time Management Project**

Engineering Test Satellite-VIII (ETS-VIII)
Quasi Zenith Satellite System (QZSS)

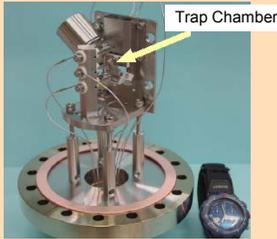
Generation and Dissemination of Space, Time and Frequency Standards

Space, Time and Frequency are the fundamental physical quantities in the field of Science and Technology.

They are the important indexes of any kinds of digital information and are very important for safety and security of everybody's life.

Developments of Next Generation Frequency Standards

Emission of light from trapped Sr atoms.



+Ca Single Ion Trap

New Frequency Standards in the Optical Region

Towards better frequency standards

Generation and Dissemination of Stable and Accurate Japan Standard Time (JST)

Primary Frequency Standard



JST System



Atomic Clocks



Determination and maintenance of UTC(NICT) to be consistent with UTC within 10sec of difference and 5ns of variance.

LF Radio

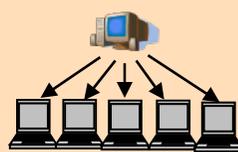
Telephone Line

Internet (NTP Services)

Frequency Calibration Services

Time Business Services

Dissemination of Frequency (10^{-12}) and Time ($10\mu\text{s}$)

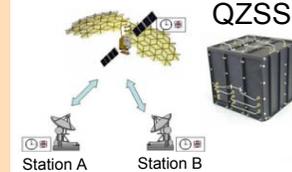


High Quality Frequency Calibration (5×10^{-14})

Precise Time and Frequency Transfer Methods and Space Geodesy

ETS-8 (Engineering Test Satellite)

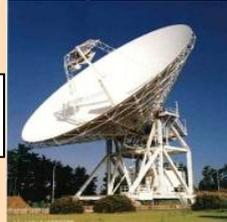
QZSS (Quasi Zenith Satellite System)



Satellite T&F Transfer

BIPM, National Timing Laboratories, ...

Precise T&F Transfer



e-VLBI

International time and frequency transfer and satellite navigation

Establish integrated space and time infrastructure to provide and certificate position and time.

Integration of Space and Time Information

Integrated Space and Time Infrastructure

Provide accurate and reliable spatial and timing information to support secure and safe ICT.



Pedestrian navigation, certification of time and position of various information.



Protection of intellectual properties and electric commerce.



Secure infrastructure for e-mails, GIS, etc.

NICT T&F Training Program

Purpose

To offer opportunities for professionals in the field of time and frequency standards to learn about technical operations and fundamental background of the field.

Provide hands-on lectures using actually used hardware to improve practical skills on

- Time keeping
- International time and frequency transfer
- Dissemination
- Calibration of the standards.

Held every year from 2001 until 2005 and then every two years.

NICT T&F Training Program (Schedule)

- Oct.16 (Fri.) Introduction (Y. Koyama)
UTC, TAI, Circular-T (M. Hosokawa)
Status Report (All Participants)
Ice Breaker Refreshments (All Participants)
- 19 (Mon.) Time Keeping
JST System 1 : JST, Algorithm (K. Imamura)
JST System 2 : DMTD, TIC (K. Imamura, F. Nakagawa, H. Ito)
LF (N. Kotake)
- 20 (Tue.) Time Transfer
NTP, IEEE1588, Time Stamp (T. Iwama, A. Machizawa)
Global MRA & Traceability (H. Saito)
Calibration & CMC (T. Iwama, H. Saito)
- 21 (Wed.) Time Transfer
TWSTFT (H. Maeno)
GPS (T. Gotoh, T. Hobiger)
- 22 (Thu.) Research Activities of NICT
Relativity (M. Hosokawa)
Atomic Standard (T. Ido, M. Kajita)
QZSS, ETS8 (S. Hama)
VLBI (Y. Koyama)
- 23 (Fri.) Final Report Preparation and Round Discussion

Requests and Suggestions

Status Report (Oct. 16, Afternoon)

Please introduce current T&F activities at your institute.

10 minutes for each participant

- About your institute
- System description of standard time UTC(k)
- Time comparison or time transfer method
- Distribution system of Standard Time
- Other activities
- Your interests

Final Report

Please submit a report about this training program at the end of the program (Oct. 23) or by e-mail to hiromi@nict.go.jp not later than Oct. 30. We expect the report will include your plan to incorporate the information and expertise you learned from the training program, suggestions for future training program, and ideas to encourage T&F activities in the Asia-Pacific region.

There will be no restrictions on the format and length of the report.

Questions and Consultations

You will have an opportunity to ask questions and consultations from our staff after 16:00 every day from Oct. 19 to Oct. 22. Please use this time to learn more in detail about the items presented during the lectures.

