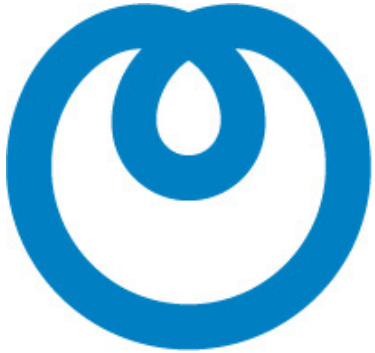

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R&D Laboratories

At The

OIF WORLD INTEROPERABILITY DEMO

SUPERCOMM 2004 Chicago

Toward Early Realization of a Truly Resonant Communication Environment

- **Services**
  - **The NTT Group supplies total services that integrate everything from terminals and access to platforms and applications.**
- **How?**
  - **On the basis of the next-generation network architecture "RENA" (REsonant communication Network Architecture)**
    - **a telecommunications infrastructure to support the resonant communication environment**
    - **OIF UNI/E-NNI and Service Adaptation activities can enrich the some portion of the RENA's functions.**

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NTT Labs' functional role in the demonstration (UNI, E-NNI, GFP)

- NTT hosts the UNI/E-NNI interoperability testing site.
  - E-NNI Equipments
    - CIENA CoreDirector CI
    - NEC SpectraWave U-Node
  - UNI Equipments
    - Avici SSR
    - CIENA UNI-C emulator
    - NEC UNI-C emulator
    - NTT OXC, Type-X, FITEL G80, UNI-C emulator
- E-NNI connection to other sites
  - Asia CT, KDDI
  - Europe DT
  - US AT&T, Verizon

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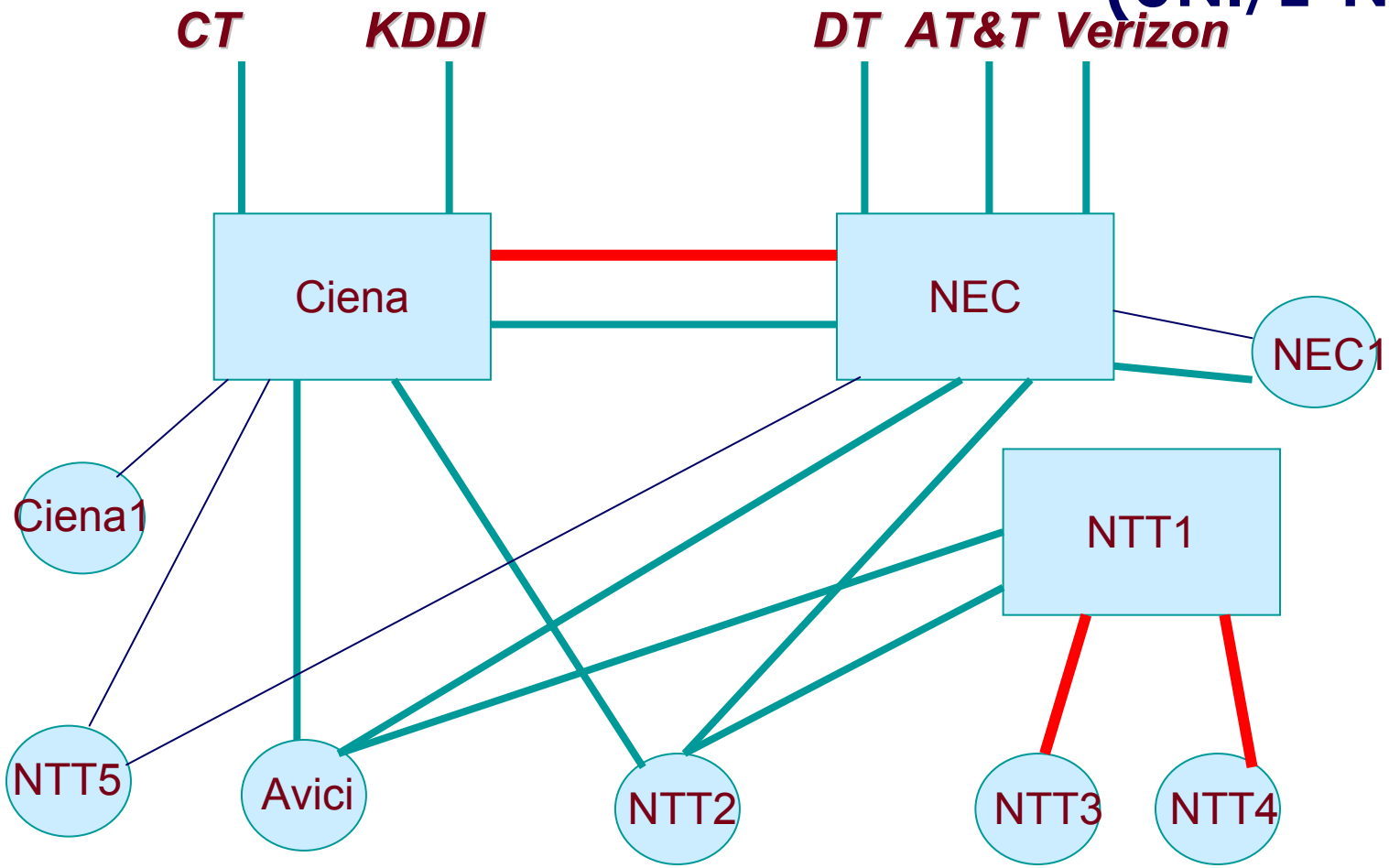
Network interface topology diagram in NTT site (UNI/E-NNI)



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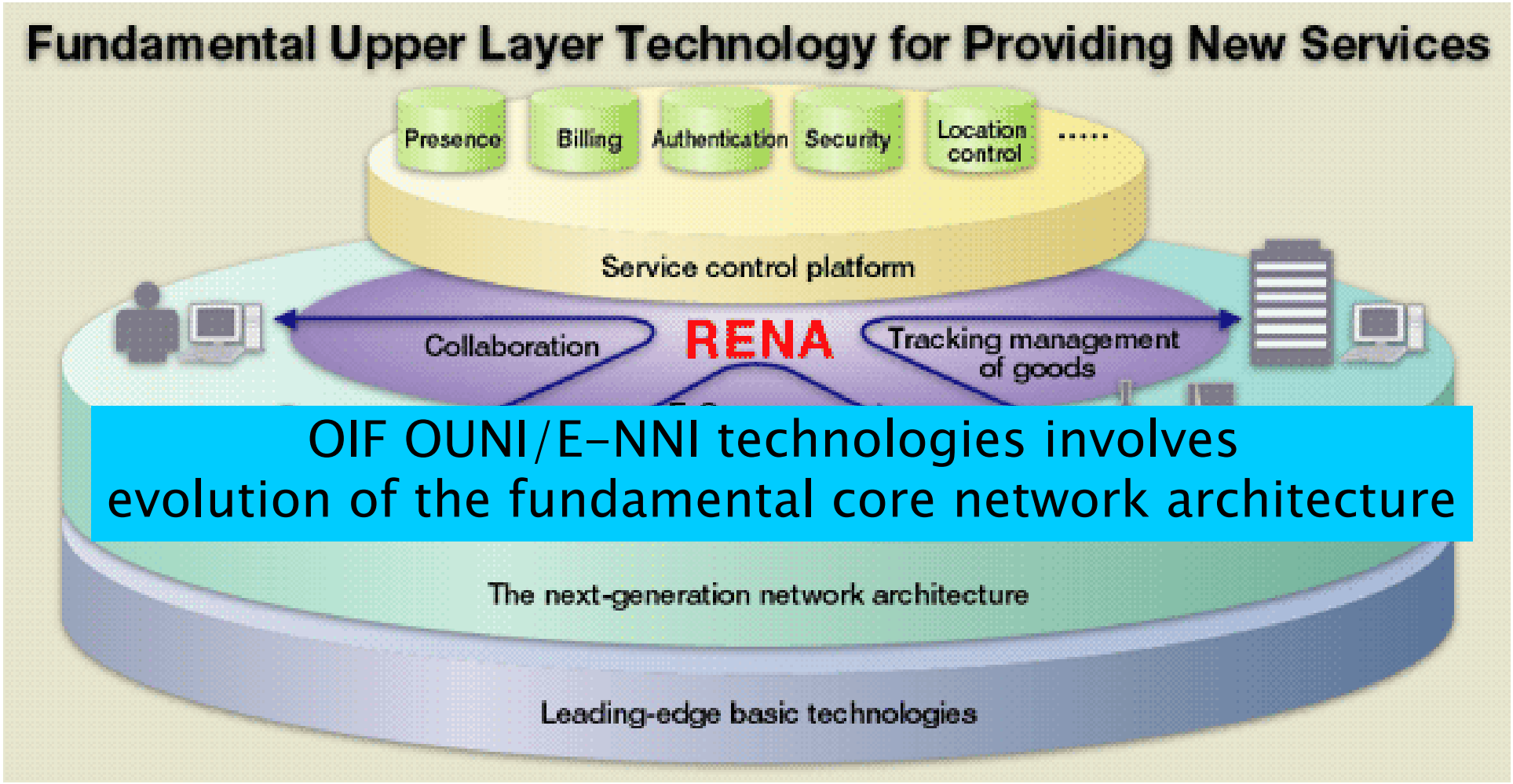
NTT R&D Laboratories will focusing on developing Next-Generation Network Architecture (RENA)



OIF OUNI/E-NNI technologies involves evolution of the fundamental core network architecture

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Why RENA requires Intelligent Optical Network?

- Distributed intelligence (control plane)
  - Scalability
  - Reduced carrier-specific management system development
  - Technology reuse
- Dynamic network reconfigurability
  - Reduced inventory and dependence on forecasts
  - Improved customer service
  - Reduced provisioning times
- New service enabler
  - Bandwidth on Demand
  - Optical VPN and Layer 1 VPN
  - Scheduled connections

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Optical User to Network Interface (OUNI)

- OUNI: allows clients to dynamically request bandwidth from the intelligent optical network
  - Signaling for connection establishment, modification, deletion and query
  - No topology information exchanged between client network and carrier optical network
- Potential OUNI applications:
  - Reduced operations overheads – simplified provisioning of new IP router connectivity
  - New services: bandwidth on demand, optical VPN, layer 1 VPN
  - Integrated IP and optical failure recovery mechanisms

Intra-carrier Network-to-Network Interface (Intra-carrier E-NNI)

- Intra-carrier E-NNI: interworking between "control domains" to provide:
  - Summarized topology and reachability information across domains
  - Signaling for connection establishment, removal and restoration
- Immediate Intra-carrier E-NNI applications:
  - Interworking between proprietary control planes
  - Interworking between subsidiary operating companies networks
  - Interworking different transport network technologies
    - E.g., all-optical and opto-electronic, OTN and SDH/SONET