

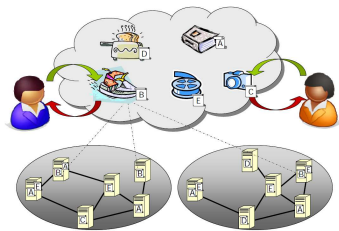
— VIRTUAL NODE LAYER MOBILITY —
— MANAGEMENT —
IN
NETWORK OF INFORMATION

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WHAT IS NETWORK OF INFORMATION (NETINF)?

- World Wide Web is the system of interconnected documents. Similarly, today's Internet is a system of interconnected nodes.
- Many objects (e.g files) in this network has similar semantic meaning but there is no proper way of presenting this semantic relationship.
- This results into complicated and inefficient information dissemination & retrieval.
- Available solutions (e.g. P2P overlays like Bit Torrent) are complicated for a common user.
- Users are interested in the information and not where they are stored.

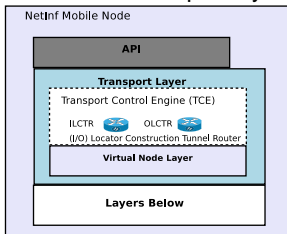


NETWORK OF INFORMATION MOBILE NODE (NETINF-MN), SALIENT FEATURES

- 1 Improved extension of basic node architecture of Network of Information.
- 2 Inherits functionalities of Locator Identifier Separation Protocol Mobile Node (LISP MN) for interoperability in NetInf and non-NetInf sites.
- 3 Inclusion of Virtual Node Layer in the node architecture, providing support during handover.
- 4 Situations where there is a disruption or disconnectivity, NetInf-MN acts as storage devices (preventing data loss).
- 5 The unpredictable motion of mobile nodes complicates the design of mobility and routing algorithms. NetInf-MN supresses it through VNL abstraction and the cross layer (Link & Network Layers) mobility management.

NETINF-MN ARCHITECTURE

- The architecture is a layered structure. The layers below are similar to the TCP/IP protocol stack with link and network layers at the bottom.
- Since we envisage an end to end mobility support, the major contribution is in the transport layer. The VNL works closely with the layers below.



- The Transport Control Engine (TCE) is responsible for the coordination of protocols used for accessing NetInf objects.
- Inner Locator Construction Tunnel Router (ILCTR) and Outer Locator Construction Tunnel Router (OLCTR) work under NetInf & non-NetInf sites.
- The API provides interface to users to access NetInf.

NETINF MN VIRTUAL NODE LAYER (VNL)

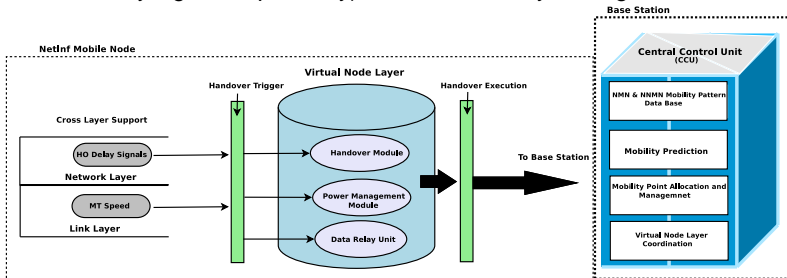
- The VNL is a programming abstraction in NetInf-MN architecture. It provides following basic functions.
 - **Smooth Vertical Handover:** In case of (inter/intra) domain handoff, VNL together with the Layer (2+3) collaboration.
 - **Power Management:** In case of non activity in a network, power management by lowering the paging signals for location update by mobile terminals.
 - **Data Relay Service:** In case of challenged environments where there is a frequent disruption in connectivity, NetInf-MN provides temporary storage or relay service to store the data packets.

VNL WORKING PRINCIPLE

- For Non-NetInf-MN (NNMN), Mobile Agent (MA) is used which works replicates NMN (NetInf Mobile Node) state on NNMN.
- VNL consists of three basic modules which are:
 - Smooth Vertical Handover (VHO) module.
 - Power Management Module.
 - Data Relay Module.
- Each cellular network consists of a Centralized Control Unit (CCU) working within the base station. CCU collaborates with NMN & NNMN and estimates:
 - Probability of NMN & NNMN stay duration in the cellular network.
 - Cross layer mobility management, predicting the threshold value of the Received Signal Strength) RSS to initiate the handover.

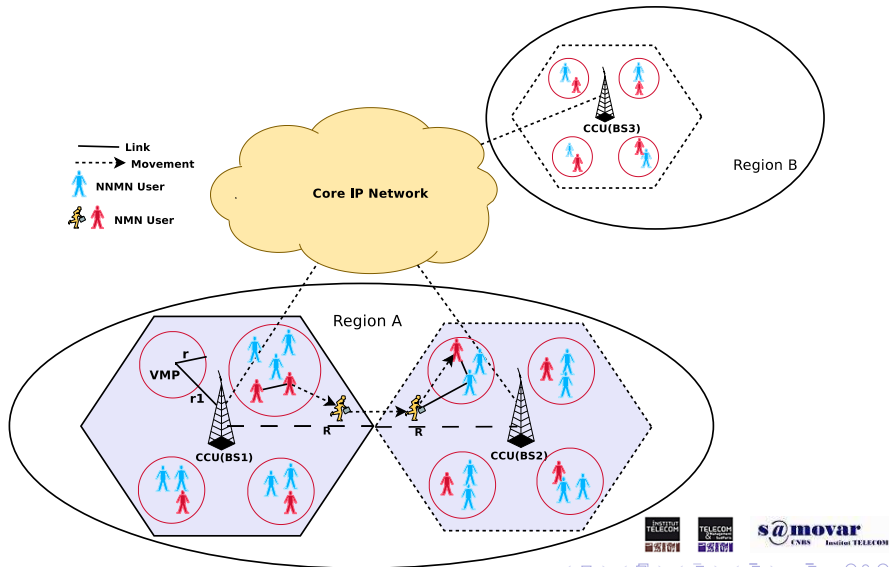
CROSS LAYER MOBILITY SUPPORT FOR VNL

- Our proposed scheme involves cross layer (Layer 2 & 3) coordination with VNL to support handoff.
- Link and network layer parameters (i.e. mobile terminal speed and handoff delay signal respectively) influence mobility management.



- The VNL unit together with the Link and Network layers estimates the above parameters (to initiate handoff) and update the CCU.
- The cross layer mobility support is shown along with different working units.

HANDOVER SCENARIO



FUTURE WORK

- Development of VNL abstraction and its implementation in Network of Information architecture.
- Extensive simulation of the presented handover scenario to obtain the desired results during handoff situations.
- ILCTR and OLCTR router abstraction performance evaluation in NetInf and non-NetInf sites.
- NMN's data relay service implementation using DTN gateway architecture for interoperability between different wireless network technologies.
- Comparison of the obtained results with the existing solutions.

Thank you!