

Future network

Naming and Addressing

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An introduction

- ❖ What is the objective of this technical report?
- ❖ Why are Naming and addressing schemes corner stones of telecommunication networks and information systems.
- ❖ What are the challenges of new NAS?
- ❖ What is the purpose of this TR?

History of working draft

WD version	Circulation	Discussion	Bodies	Location
1 st WD	2011 -Jan	2011- Feb	SC6/WG7	Interim meeting at London, UK
2 nd WD	2011- May	2011 - June	JTC1 & SC6	Plenary meeting at San Diego, USA
3 rd WD	2011 - Sep	2011 - Sep	SC6/WG7	Interim meeting at Barcelona, Spain
4 th WD	in processing ...			

The sections of WD

1. Scope
2. References
3. Definitions
4. Abbreviations
5. Background and project outlook
6. Problem statement
7. Gap analysis
8. Requirement
9. FN-NAS standardization plan
 - Annex A : Current Internet technology
 - Annex B: Current Internet Views
 - Annex C: Location Management and Routing using GAS

1.Scope

❖ Requirements

- general characteristics & their impact on NAS design.

❖ Problem Statement

- characteristics & deficiencies of existing NAS in old networks

❖ Gap analysis

- examine the gap between old network NAS and future network

❖ Design Objectives

- specify objectives and principles for NAS design

❖ Technical Challenges

- a list of major technical challenges , overcomings

❖ Development Guidance

- how to future NAS standardization can progress.

2. References

❖ Normative reference

- ISO/IEC PDTR 29181-1, Future Network: Problem Statement and Requirements – Part 1: Overall Aspects.
- RFC 1498, On the Naming and Binding of Network Destinations.
- RFC 1955, New Scheme for Internet Routing and Addressing (ENCAPS) for IPNG

❖ Informative reference

- IETF draft-ietf-lisp-10 Locator/ID Separation Protocol (LISP)
- IETF RFC 4140, Hierarchical Mobile Ipv6 Mobility Management (HMIPv6)

3. Definitions

❖ Locator/ID Separation Protocol (LISP)

- PI address, PA address, Routing Locator (RLOC), Endpoint ID(EID),
Ingress Tunnel Router (ITR), Egress Tunnel Router (ETR),

❖ HMIPv6, IETF RFC 4140

- Access Router (AR), Mobility Anchor Point (MAP), Regional Care-of
Address (RCoA), In-Link Care-of Address (LCoA)

❖ This Technical Report

- Future Network Naming and Addressing Schemes , Naming , Locator
(LOC), absolute LOC, Relative LOC, Node ID (NID)

5. Background and project outlook

- ❖ Past Work on FN-NAS
- ❖ Current Achievement on FN-NAS Research
- ❖ FN-NAS Development Challenges
- ❖ FN-NAS Development Plan

Past Work on FN-NAS

- ❖ In Paris (Oct.2007) - presentation from China (by Xie Jianping)
- ❖ Korean experts presented a new concept of position-based Geographical Addressing Scheme
- ❖ In May 2009, Chinese experts presented a document entitled “Future Network Naming and Addressing Schemes: Problem Statement and Design Objectives” (6N13948).
- ❖ In Spain meeting (Jan. 2010), SC6 adopted an action plan to speed up FN Standardization process in SC6.
- ❖ In London(Sep.2010), SC6 decided to split the existing technical report (TR.FNPSR) into seven parts and NAS was made Part 2. Xie, Zhang and Kahng were nominated as project editors.

Current Achievement on FN-NAS Research

- ❖ A clean slate designed new NAS.
- ❖ NAS is an essential building block of FN and NAS standardization should be among the top priorities.
- ❖ New NAS must be developed.
- ❖ Some new NAS concept and schemes have been presented and discussed.
- ❖ ISO/IEC has been a step ahead of other FN projects in the area of NAS development.
- ❖ SC6 has also given consideration to the most troubling conflict between clean slate design and backward compatibility.

FN-NAS Development Challenge

- ❖ Future Network is an ambitious project
- ❖ The clean slate design approach would face several problems
- ❖ The complication problem of networks

FN-NAS Development Plan

❖ Step 1 - **Situation Analysis**

- to study the need for NAS and its relationship with and position in Future Network. This step has mostly completed during 2007-2008.

❖ Step 2 - **Project Visioning**

- to set missions for FN-NAS, set project objectives, identify major problems, look for approaches, establish development guidelines, etc.

❖ Step 3 - **Technical challenges**

- to achieve the lofty visions of Future Network, FN-NAS has to overcome many technical challenges.

❖ Step 4 - **Proposal evaluation**

- After Step 3 is complete SC6 should send out calls for proposals which would compete for acceptance as FN-NAS candidate and technology provider

❖ Step 5 - **Standard development**

- NAS standards will be developed based on the core FN-NAS technology.

6. Problem statement

- ❖ Naming and Addressing in Network Operation
- ❖ NAS Types
- ❖ Difficulty in network integration
- ❖ NAS and Network Performance
- ❖ Technical limitations of old naming and addressing system

Naming and Addressing in Network Operation

Naming and addressing are two closely related core schemes in any network designs and both uniquely identify a host or an interface

□ Naming

* a scheme which gives identity to every computer or object connected with the network or the party who is going to send or receive information from the network

□ Addressing

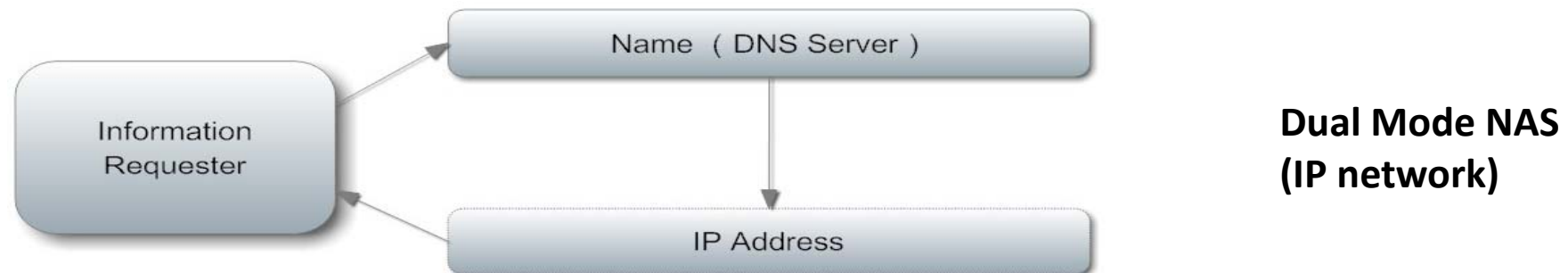
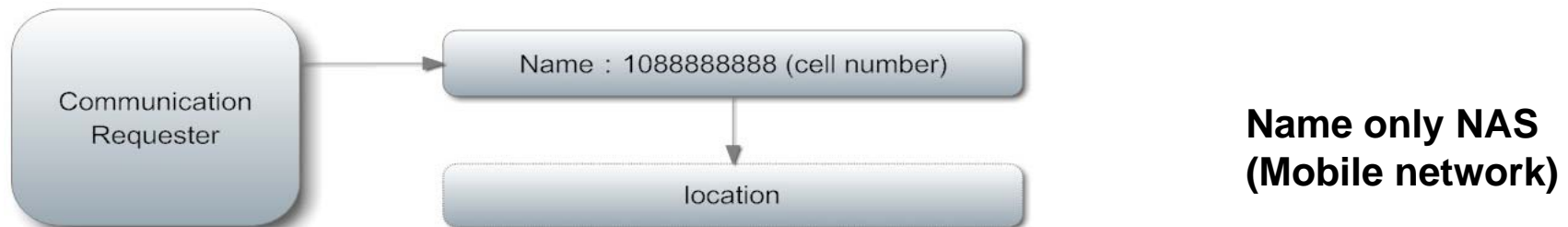
* a scheme which provides information on the point where the sender or receiver is located in the networks. It contains two mechanisms, one is to define the location (address format) and another is to specify how to find the addresses

NAS types

❖ Telecom Network Naming and Addressing Schemes



❖ Computer Network Naming and Addressing Schemes



Difficulty in network integration

- One objective of FN is to integrate various kinds of networks into one system
- Complicated integration based on various naming and addressing in old network
- The difference of telecom networks & computer networks
 - addressing formats
 - naming formats.
 - method of addressing searching, transporting and forwarding.
 - naming and addressing methods.
- **A better way would be to create a totally new network**

Technical limitations of old NAS

- Central Registration Authority
- Address Space exhaustion
- Address costs
- Identifier-locator unification
- Routing Table
- Vertical Structure
- DNS Translation DNS
- Data Encryption
- Category addresses
- Lack Geographic Consideration
- No address in native language
- No decimal naming system
- IPV6 Limitations IPv6
- New demands on old naming

NAS and Network Performance

- Only after naming and addressing schemes are set, the whole architecture and other subsystems such as router designs and application services can have a base to start work on.
- NAS structures may affect network performances
- NAS format influences network security
- NAS format influences accuracy for information delivery, etc.

7. Gap Analysis

- ❖ The need for a Clean Slate Design
- ❖ Future Network Design Goals
- ❖ The Gaps

The need for a Clean Slate Design

- Current IP-based networks have many deficiencies.
- Those deficiencies result from structural designs.
- Problems in current IP-based networks due to NAS.
- It is impossible to overcome those problems without structural overhaul.
- The evolutionary approaches such as IPV6 are inadequate to fix the problems.
- Clean slate design principle of FN is justified.
- A clean-slate design must include redesigning the NAS.
- Searching for the gaps between the future goals and current systems.

Future Network Design Goals

- Scalability
- Security
- Mobility
- Robustness
- Heterogeneity
- Quality of Service
- Customizability
- Economic incentive

The Gaps

- On scalability
- On security
- On mobility
- On Quality of Service
- On Heterogeneity
- On Robustness
- On Customizability
- On economic incentives

8. Requirement

- ❖ Content Description
- ❖ System Technical Requirements

Content Description

- System Requirements: design concepts, system architecture,
- Special NAS requirements: address format, network space, network communication structure, routing, DNS, protocols, security...
- Foreseeing mechanism: the benefit of FN for human society in the future.
- Compatibility Requirement: the influences of FN-NAS for network space, resources, protocols, architectural modes, security, QoS, routing protocols, upper layer protocols, interoperability.
- Others: FN forward compatibility, future continuous development and testing and compliance requirements.

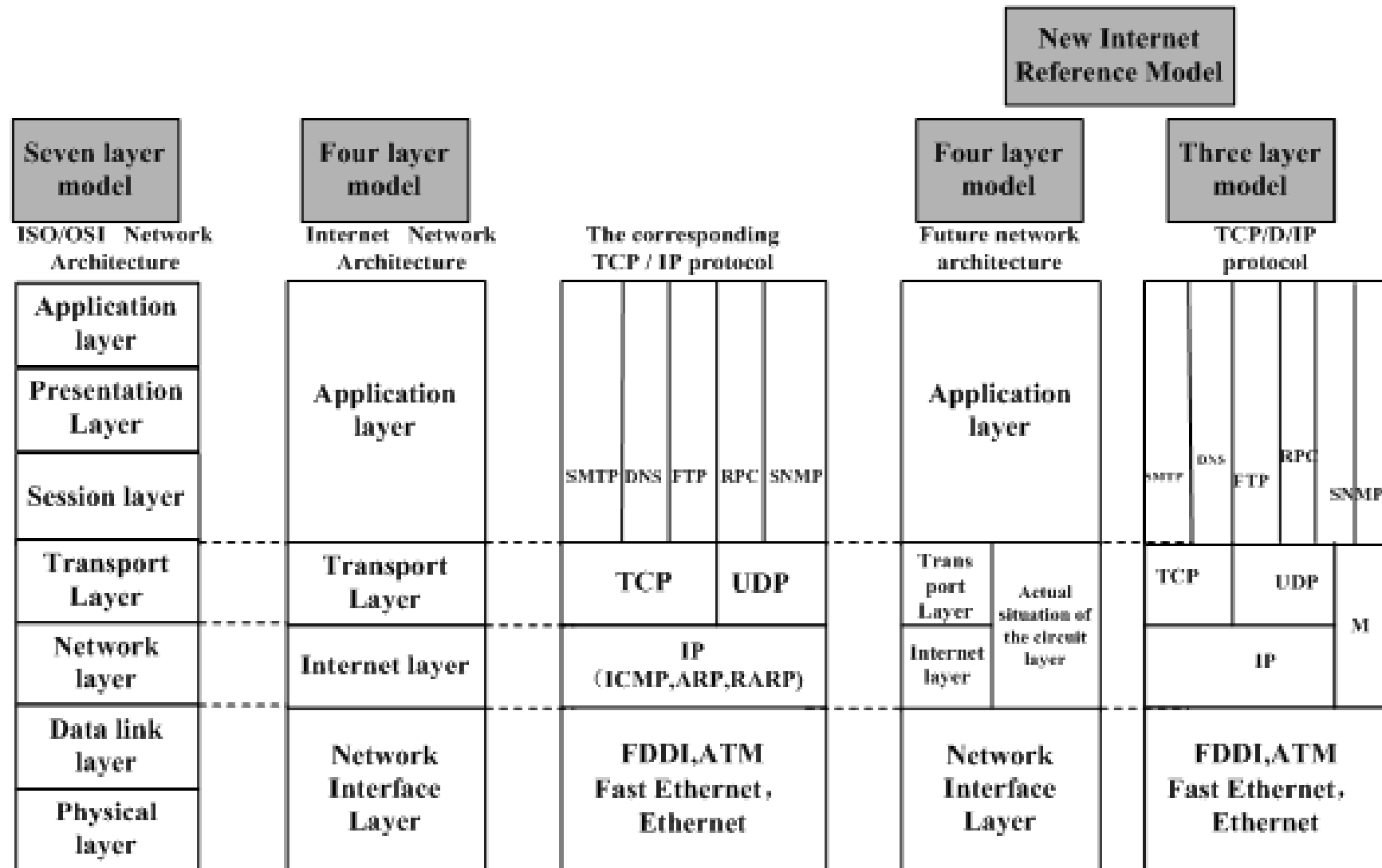
System Technical Requirements (1)

No	Name	Description
R001	System integrity requirement	naming, network space, network resources, addresses, network architecture, predictive mathematic model, application, experiment, testing
R002	Intersystem coherence requirements	consistent, supportive, benefit, interoperation, compatibility and mutual support
R003	Structural requirements	Good human-machine interface, Support conventional computing, secure network structure, communication method mixing , Direct routing network architecture , Fast and large capacity network services, Been able to interoperate with existing networks, Having better performance than existing networks , separation data and control plane
R004	Specific technical requirements	Address format, ID and locator split, addressing model, address space, variable address length, address type, address selection, fields in addressing, domain name translation, translation/tunneling local and backbone networks

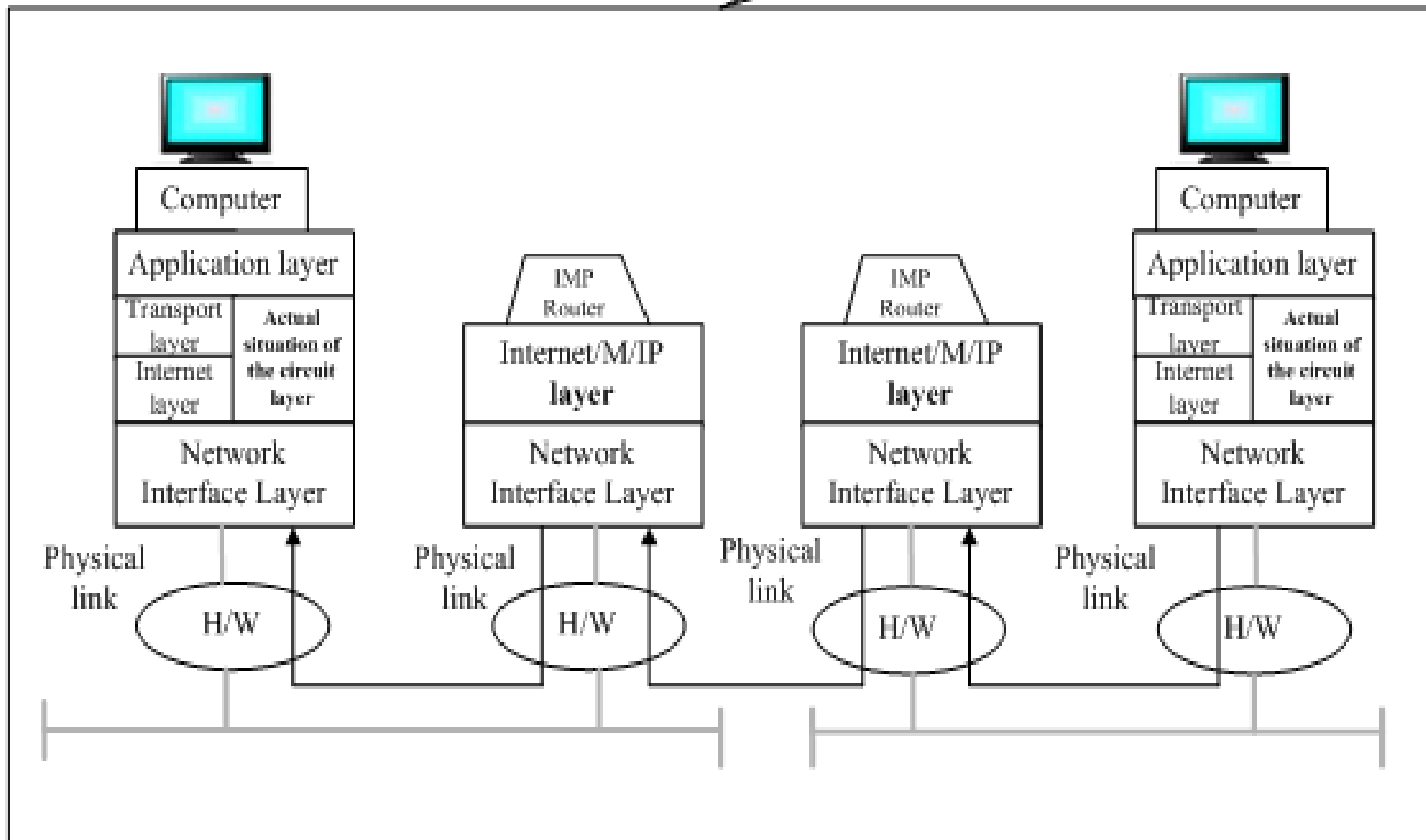
System Technical Requirements (2)

No	Name	Description
R005	Complementary /Security technical requirements	new communication rules to supplement new NAS, address allocation encryption system requirement, head requirement, emergency routing
R006	Extension technical requirement	future space communication and space-earth communication will rely more and more on internet system. There will be a new application area in Space Internet.
R007	Evaluation and test requirements	During the process of FN development and design, the testing and experimenting technologies and certification requirements should also be developed and standardized
R008	Infrastructure requirements	The construction of FN experimental platform , construction of FN Backbone, Experiment of transition of existing networks to FN, construction FN system and connect with existing networks, building management systems, building application platforms.

The network model for future (1)



The network model for future (2)



9. FN-NAS Standardization Plan

- ❖ Major tasks in the future
- ❖ Timeline
- ❖ Next step
- ❖ Coordination with other organizations

Major tasks in the future

- 1) Refine and complete this technical report
- 2) Look for and select the best proposal for a general framework on FN-NAS
- 3) Standardize the general framework of FU-NAS
- 4) Make standards of specific schemes under the general framework of FN-NAS
- 5) Make complementary standards or imbedding FN-NAS into FN system
- 6) Provide NAS assistance to study of FN applications
- 7) Start work on registration and distribution of numbers and addresses for FN
- 8) Make a plan for address resources management policies

Timeline

Task	2007-2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020-2030	
NWI	■											
TR-Strategy		■										
NAS Framework		■										
NAS Standardization				■								
System Development						■						
Application								■				

Next step

- 1) This report is circulated to SC6 national bodies for review and comment as PDTR document.
- 2) During this time, SC6 considers encouraging Chinese experts to prepare for further step on FN-NAS.
- 3) The work should start on drafting a “Call for Proposal on the overall framework of Future Network Naming and Addressing Scheme”. (until Dec.2011)
- 4) 2012 will be focusing on the evaluation and selection of FN-NAS Framework Proposals.

Coordination with other organizations

- ❖ Maintain Independence: new set of naming and addressing schemes don't comply to restrictions in any old rules
- ❖ Future Network can adopt for the essential policies.
- ❖ As to other new NAS projects, FN-NAS will follow the ISO/IEC directives regarding avoiding overlapping, duplication and contradictions
- ❖ FN-NAS will adopt an open attitude and will consider all new network concepts and technologies from the international community



Welcome your consideration and
comments to us

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