

# Information Centric Networking

- Enabling 5G for Future Applications

*Laying the  
foundation  
for Digital  
Communication  
Standardisation  
in India*

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# Evolution of the Current Network

## Re-defined applications

- Evolution of social media, online gaming, video on demand, etc.

## Data creation, consumption and transfer

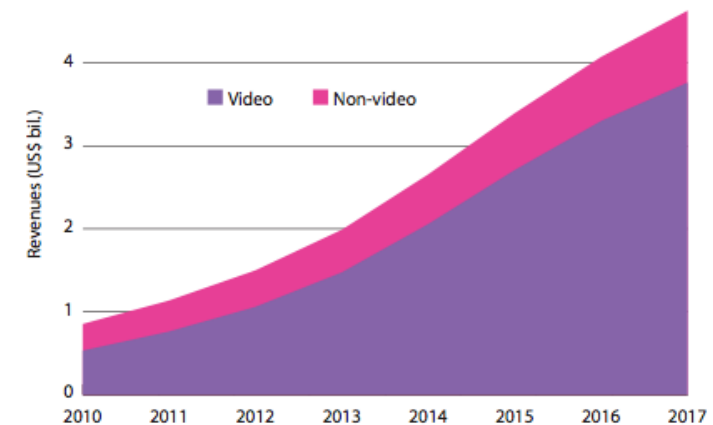
- **Massive - 2.5 Exabytes of data per day !! and growing**
  - Dominated by video content - 70% of traffic belongs to YouTube, Netflix, Amazon, iTunes, Facebook
  - In every 5 minutes of real-time 60 hours of video is uploaded to YouTube
  - Reached 6 billion video views per day, the journey that started on April 2005

## Both consumer and producer are mobile

- More than 30% people have smart phones

## Users are very sensitive to QoE

- 19% abandon a site if it takes more than 5 sec

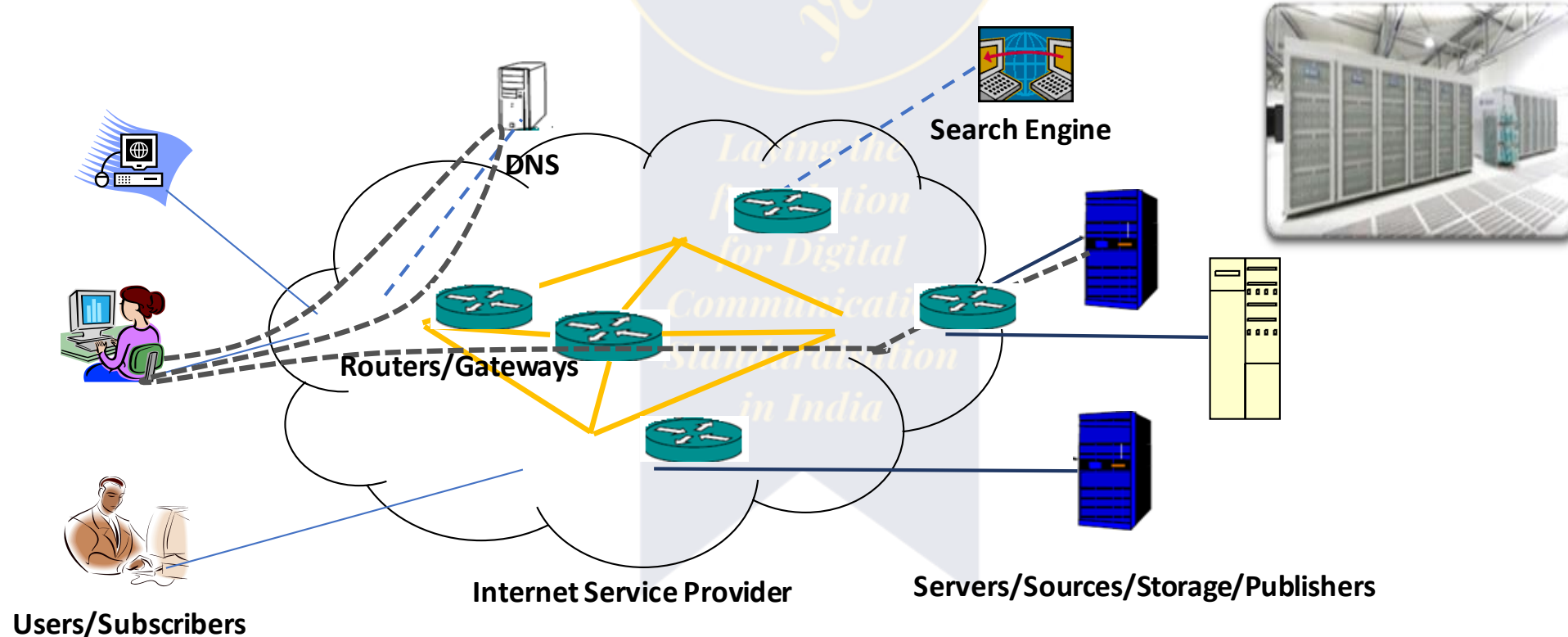


<http://www.globaldots.com>

# Current Network Architecture

## Data Communication is between 'host-to-host'

- Source and user addresses are to be unique
- Uses TCP/IP Protocol extensively



# Challenges with Current Network

## Network Congestion

- Access network: Capacity and latency is a major concern !
- Enormous amount of data to handle with diversity of applications !!
- Core network: Limited bandwidth

## Network capability

- Multicast, broadcast are not explored fully

## Security is end-to-end

- Content is not secured !

## Reliability for content access

- Difficult in case of communication link failure

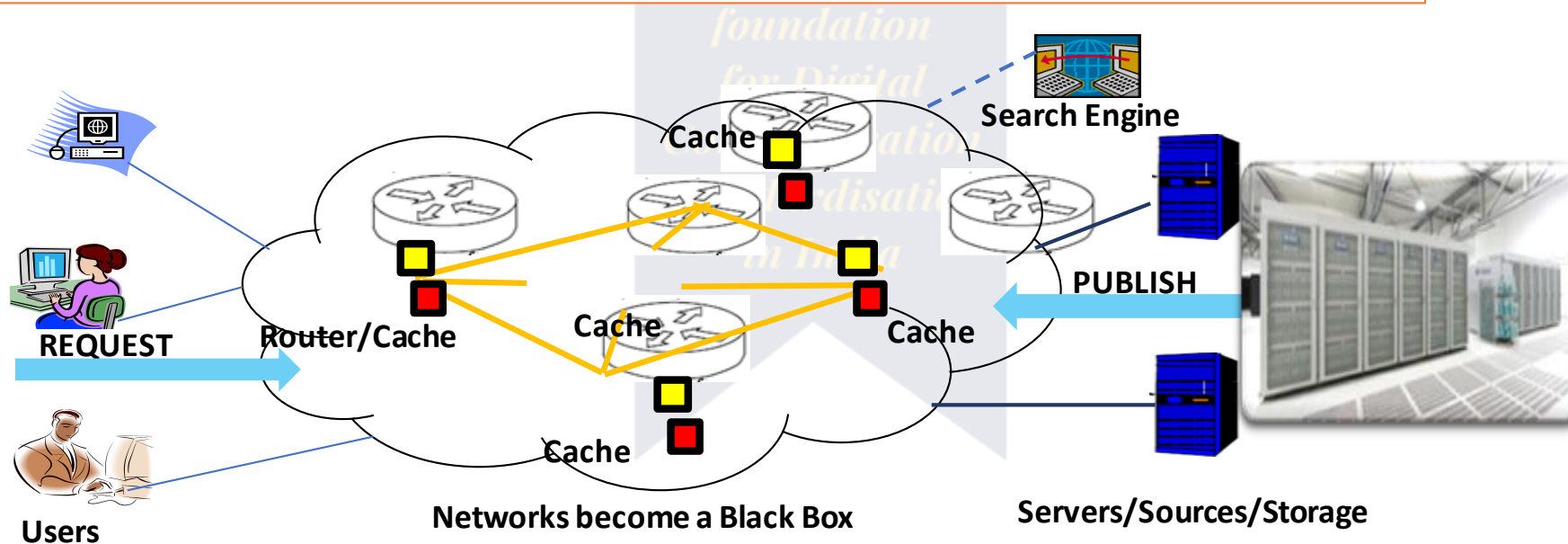


**Is there an alternative available ?**

# Information Centric Networking (ICN)

## Information or the Content is the key

- **Information is decoupled from the source**
  - Name Based access to the content !
  - Independent of location, application, storage, transportation, caching etc.
- **Network manages the information, not the end-points (sources)**
  - Network should be aware of the information and its current location
  - Same information should not travel more than once at a time in the same link



# Myths about ICN

ICN is same as CDN.

ICN does something similar as Proxy in my organization.

ICN is same as BitTorrent.

ICN is all about caching.

# ICN Standardization @ TSDSI

A Technical Report (TR) has been published for ICN India Use Cases

ICN standards to be developed for different vertical use cases

ICN has been identified as the potential enabler for future applications

ICN Standardization activity has been supported by

- TCS
- Reliance Jio
- Huawei
- IIT Bombay
- IIT Bhillai
- I2TB

# ICN Use Cases for India

## ICN for A/V Conference , AR/VR etc.

- Supporting larger concurrent connection
- Reducing the need of redundant repeated transmission over the network

## ICN for Robotics

- Decouples content from the location/identification of the robot

## ICN for IoT

- Publishing certified Sensor data through an ICN proxy function
- Seamless session management and continuity
- Enhanced Security

## ICN for Mobile Edge Computing and Caching

- Caching the content closest to Computing node
- Network manages the content not the users applications

## ICN for eMBMS

- Mobile users are largest producer as well as the consumer of the data !



# ICN @ International SDOs

## IRTF (ICNRG)

- Involved with ICN architecture and protocol standardization
- Currently NDN is considered as the de-facto standard

## ATIS (US SDO)

- ATIS has multiple use cases under consideration such as AR/VR, IoT
- Published white paper(s) and working on Use Case verification

## IETF

- Ongoing efforts to form WG to harmonize ICN architecture and adoption

## ITU-T SG13

- Exploring standardization gaps for non IP Protocols

## 3GPP SA2

- Addressing ICN related goals in 5G standardization

## NIST

- Conducting multiple workshops and conference
- IoT is the primary use case under consideration

# ICN artifacts

## TSDSI

- Technical Report with India Use Cases for ICN

## IETF

- Internet Drafts:
  - ICN based Architecture for IoT – Huawei, UCLA, WinLab, Inria
  - ICN in LTE, 4G Mobile Networks – Cisco, InterDigital
- RFCs:
  - RFC 7476 – Information-Centric Networking: Baseline Scenarios
  - RFC 7927 – Information-Centric Networking (ICN) Research Challenges
  - RFC 7933 – Adaptive Video Streaming over ICN
  - RFC 7945 – ICN: Evaluation and Security Considerations

## ICN Architectures

- Named Data Networking (NDN) – Proposed by UCLA
- Overlay ICN (O-ICN) – Proposed by TCS
- Other ICN architectures



# Thank You !

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