

## **Title: Erasure Coding Meets Three Screens and the Cloud**

### **Abstract –**

The demand for smooth experience cross three screens (PC, TV and Phone) is all-time high. This becomes possible with the rapid advancement of the Cloud. Three screens and the cloud together unleash tremendous opportunities by enabling new application scenarios and services. However, the expectation of such applications and services is also more demanding than ever – snappy responsiveness and superior quality at extremely affordable costs. Erasure coding is being rediscovered as a crucial technology to meet the high expectation of these emerging application scenarios and services.

In this tutorial, we cover the basics of erasure coding. We introduce several popular classes of erasure codes, including MDS codes (Reed-Solomon codes and array codes), network codes and storage codes. We walk through a series of application scenarios and services, where erasure coding is innovatively applied to derive solutions offering snappy responsiveness and superior quality at extremely affordable costs. The application scenarios and services cover i) social gaming; ii) content distribution; iii) vehicle communication; iv) virtualization and consolidation; and v) cloud storage.

### **Outline of topics –**

- Basics of erasure coding
- Popular classes of erasure codes
  - MDS codes (Reed-Solomon and array codes)
  - Network codes
  - Storage codes
- Erasure coding in emerging application scenarios
  - Social gaming
  - Content distribution
  - Vehicle communication
  - Virtualization and consolidation
  - Cloud storage

### **Intended audience –**

This tutorial is targeted at any researchers, developers and program managers who are curious whether erasure coding is the right technique to improve networking and storage systems. These systems include, but not limited to, real-time conferencing systems, content distribution systems, social gaming platforms, cloud services, and distributed storage systems. No hard-core math or programming knowledge is required. The goal is for the participants to come away with basic concepts of erasure coding, understandings of various classes of popular erasure codes, appreciation of how erasure coding is applied in a wide range of emerging application scenarios, including social gaming, content distribution, vehicle communication, virtualization and consolidation, and cloud storage.

## **Speaker biography –**

Cheng Huang is a Researcher at Microsoft Research, Redmond. He works extensively on erasure coding technologies and has helped to develop solutions that are now deployed in many Microsoft products, including i) Lync for smooth video conferencing, ii) Xbox for low latency messaging between game consoles and Xbox Live data centers, and iii) Windows Azure Storage for significant cost savings, which also won him and his collaborators the USENIX ATC Best Paper Award in 2012.

Cheng Huang received the BS and MS degrees in electrical engineering from Shanghai Jiao Tong University, and the PhD degree in computer science from Washington University in St. Louis. Besides erasure coding, he works extensively in cloud services, internet measurements, distributed storage systems, peer-to-peer streaming, networking and multimedia communications.