



Select Aspect of Protocol Implementation, Inter-Layer Communication and Performance Evaluation of Computer Networks

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Interaction Points

- Introduction to basics
- Topics of concern in Performance in Analysis
- **An Overview of Performance Evaluation of Computer Networks**
- Common Errors / Mistakes
- **The Correct Approach**
- Models of Inter-Protocol Communication
- **Concluding remarks**



Network Performance Evaluation: Some Parameters

- Queues
- **Bandwidth**
- Throughput
- **Delay**
 - Queuing
 - **Processing**
 - Transmission
 - **Propagation**
- Jitter



Quality of Service Considerations

- Per-Flow or Aggregate Flow QoS (DiffServ, IntServ)
- **Priority of Service**
- Maximum Acceptable Delays
- **Minimum Acceptable Throughput**
- Mean Time Between Failures (MTBF)
- **Maximum Acceptable AL-initiated Abnormal Termination of Service**
- Security Specifications

Topics of Concern in Performance in Analysis

- Specification of performance requirements
- Evaluating design alternatives
- Comparison of multiple choices
- Determination of the parameters' optimal values
- Identification of the performance bottleneck
- Characterization of the workload on the system
- Determining the number and sizes of components
- Forecasting the performance in near and distant

Common Mistakes in Performance Evaluation

- Missing out on Some of the Important Parameters
- Ignore Significant Factors
- Inappropriate Experimental Design
- Inappropriate Level of Detail
- No or Erroneous Analysis
- No or Erroneous Sensitivity Analysis
- Ignoring Variability
- Ignoring Social Aspects
- Omitting Assumptions and Limitations

The Correct Approach

- Clear Identification of goals, parameters, candidate models, provision of accommodating / modelling future changes in the system and workload
- Ensuring about level of detailing
- Analysis of experimental design efficiency
- Verification of methodology
- Presentation of generated data with proper analysis
- Proof of statistically correctness of analysis

A Systematic Approach to Performance Evaluation

- State Goals and Define the System
- List Services and Outcomes
- Select Metric
 - Related to speed, accuracy and availability of services
- List Parameters
 - System parameters and workload parameters
- Select Factors to Study
 - Factors – parameters to be varied in various ‘levels’
- Select Evaluation Technique
 - Analytical modelling, simulation or measuring a real system
- Select Workload
- Design Experiments
- Analyze and Interpret Data
- Present Results



Mechanisms of Inter-Protocol Communication within a Protocol Stack

- **Mechanism / Model-1:**
 - Process-per-Protocol Mechanism / Model **or** Process-to-Process communication based on Context Switching
- **Mechanism / Model-2:**
 - Process-per-Message Mechanism / Model **or** Procedure-to-Procedure communication based on Procedure Calls



Any questions?

Thank you!