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SERIES G: TRANSMISSION SYSTEMS AND MEDIA,
DIGITAL SYSTEMS AND NETWORKS

Multimedia Quality of Service and performance – Generic
and user-related aspects

Framework for capacity assessment of packet data services in mobile networks

Recommendation ITU-T G.1023

ITU-T G-SERIES RECOMMENDATIONS
TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	G.100–G.199
GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS	G.200–G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	G.300–G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	G.400–G.449
COORDINATION OF RADIOTELEPHONY AND LINE TELEPHONY	G.450–G.499
TRANSMISSION MEDIA AND OPTICAL SYSTEMS CHARACTERISTICS	G.600–G.699
DIGITAL TERMINAL EQUIPMENTS	G.700–G.799
DIGITAL NETWORKS	G.800–G.899
DIGITAL SECTIONS AND DIGITAL LINE SYSTEM	G.900–G.999
MULTIMEDIA QUALITY OF SERVICE AND PERFORMANCE – GENERIC AND USER-RELATED ASPECTS	G.1000–G.1999
TRANSMISSION MEDIA CHARACTERISTICS	G.6000–G.6999
DATA OVER TRANSPORT – GENERIC ASPECTS	G.7000–G.7999
PACKET OVER TRANSPORT ASPECTS	G.8000–G.8999
ACCESS NETWORKS	G.9000–G.9999

For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T G.1023

Framework for capacity assessment of packet data services in mobile networks

Summary

Recommendation ITU-T G.1023 establishes a framework for capacity assessment of packet data services in mobile networks.

Mobile network capacity is an underlying factor in all quality of service (QoS) aspects of a packet data-based mobile network due to the shared-resource properties of such networks. It is therefore desirable to achieve a basic understanding of related properties and corresponding performance indicators. Measuring network capacity takes, however, significantly more effort and resources, in the sense that a direct measurement of capacity requires a massive effort in terms of resources, which practically creates the requirement to use assessments.

Recommendation ITU-T G.1023 therefore provides a systematic approach to describe and characterize methods for assessment of packet data-based mobile networks and presents the appropriate framework.

Spatial resolution is an important element of this framework, i.e., the recognition that network capacity is not a quantity which is uniform over the entire network or large areas of it. Rather, due to the cellular nature of such networks, capacity, and therefore also QoS and quality of experience properties, are spatially different.

History

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Table of Contents

	Page
1 Scope	1
2 References.....	1
3 Definitions	1
3.1 Terms defined elsewhere	1
3.2 Terms defined in this Recommendation.....	2
4 Abbreviations and acronyms	2
5 Conventions	2
6 Background from Recommendation ITU-T G.1034	2
7 Differences between quality of service and capacity measurements.....	3
8 Data processing for spatially resolved assessment of network capacity	3
9 Framework specifications.....	4
10 Taxonomy of data sources for capacity measurements	5
11 Considerations on acquiring primary measurement data	7
12 Considerations on absolute accuracy and measurement data fluctuations	8
13 Examples for capacity estimation through data processing.....	9
14 Further considerations	9
Bibliography.....	10

Introduction

Estimating or validating the capacity of packet data services is required in many situations, ranging from private sector issues such as service level agreements and methods of validating appropriate commitments, up to regulatory contexts e.g., relating to conditions for licensing of frequency spectrum.

A systematic framework for this task has two components. The first deals with the spatial element, i.e., definitions allowing measurement data processing towards spatially resolved indicators. The second consists of methodologies and metrics for capacity itself.

Quality of service key performance indicators for mobile networks include one for data rate. However, caution is needed when drawing conclusions from this data rate, which is usually measured through some end to end upload or download scenario, to actual network capacity. First, a single end-user access may be data rate-limited in some way; second, today most of the measurement methodologies use the hypertext transfer protocol, i.e., a service based on the transmission control protocol (TCP), for measurement. [b-BBF MR-471.2] has shown that TCP may systematically underestimate actual mobile network capacity (which is usually defined in terms of maximum Internet protocol layer section capacity). If this is just a systematic offset, it could probably be compensated for by appropriate correction factors, but empirical data also show that fluctuation of values is considerably higher as compared to user datagram protocol-based measurements. The whole area is currently under intense study.

The framework described in this Recommendation therefore treats the method of measurement, and consequently the usage of results in subsequent processing steps, as a modular, adaptable element.