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INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS
AND NEXT-GENERATION NETWORKS

Next Generation Networks – Packet-based Networks

Routing mechanisms in public packet telecommunication data networks

Recommendation ITU-T Y.2615



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Recommendation ITU-T Y.2615

Routing mechanisms in public packet telecommunication data networks

Summary

As one hierarchical packet data network which can meet requirements of future packet-based networks (FPBNs), the public packet telecom data network (PTDN) provides a solution of efficient and reliable routing mechanisms. Recommendation ITU-T Y.2615 illustrates the PTDN routing architecture, routing models and the corresponding routing mechanisms, such as topology construction, intra-domain routing, inter-domain routing and routing procedures.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T Y.2615	2012-07-29	13

Keywords

Alternative routing, dual path routing, PTDN, routing architecture, shortest path routing.

FOREWORD

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Recommendation ITU-T Y.2615

Routing mechanisms in public packet telecommunication data networks

1 Scope

This Recommendation identifies the routing mechanisms of the public packet telecom data network (PTDN), including routing architecture, routing models and corresponding routing mechanisms, such as topology construction, intra-domain routing, inter-domain routing and routing procedure.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

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|----------------|--|
| [ITU-T Y.2601] | Recommendation ITU-T Y.2601 (2006), <i>Fundamental characteristics and requirements of future packet based networks</i> . |
| [ITU-T Y.2611] | Recommendation ITU-T Y.2611 (2006), <i>High-level architecture of future packet-based networks</i> . |
| [ITU-T Y.2612] | Recommendation ITU-T Y.2612 (2009), <i>Generic requirements and framework of addressing, routing and forwarding in future, packet-based networks</i> . |
| [ITU-T Y.2613] | Recommendation ITU-T Y.2613 (2010), <i>General technical architecture for public packet telecommunication data network</i> . |
| [ITU-T Y.2614] | Recommendation ITU-T Y.2614 (2011), <i>Network reliability in public telecommunication data networks</i> . |

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 address [ITU-T Y.2601]: An address is the identifier for a specific termination point and is used for routing to this termination point.

NOTE – Identifiers can be used for registration or authorization. They can be either public to all networks, shared between a limited number of networks or private to a specific network (private identifiers are normally not disclosed to third parties).

3.1.2 alternative routing model [ITU-T Y.2614]: A routing model providing multiple paths between a source public packet telecommunication data network (PTDN) node and a destination PTDN node.

NOTE – These paths are not required to be deterministic and unique. In this model, the sending path and the receiving path are not necessarily composed of the same nodes and links.

3.1.3 dual path routing model [ITU-T Y.2614]: A routing model providing two totally disjoint paths between a source public packet telecommunication data network (PTDN) node and a destination PTDN node.

NOTE – The two paths may not be the shortest paths.

3.1.4 public packet telecommunication data network (PTDN) [ITU-T Y.2613]: A packet data network designed for the NGN transport stratum, which should be secure, trustworthy, controllable, and manageable, can meet all the requirements described in [ITU-T Y.2601]. PTDN is a hierarchical network, which can be subdivided into several network layers.

3.1.5 shortest path routing model [ITU-T Y.2614]: A routing model providing a deterministic and unique path, which is the shortest path from a source PTDN node to a destination PTDN node.

NOTE – In this model, the path from the source node to the destination node results in the same as the path from the destination node to the source node.

3.1.6 trail protection [ITU-T G.780]: Normal traffic is carried over/selected from a protection trail instead of a working trail if the working trail fails, or if its performance falls below a required level.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 dominant node: A PTDN node in a domain, which is responsible for calculating routing and generating a routing table for every PTDN node in the domain.

3.2.2 ear decomposition: An ear decomposition $D = \{P_0; P_1; \dots; P_{r-1}\}$ of an undirected graph $G = (V, E)$ is a partition of E into an ordered collection of edge-disjoint simple paths $P_0; P_1; \dots; P_{r-1}$, called ears, such that:

- P_0 is a simple cycle.
- P_i ($i > 0$) is a simple path with the end-points belonging to lower-numbered ears, and with no internal vertices belonging to lower-numbered ears.
- P_i ($i > 0$) may also be a simple cycle. If it is a cycle consisting of only one edge, it is called a trivial ear.

3.2.3 potential energy: A numerical value derived from the PTDN node address, which should be unique to the node and can be used for selecting one path from multiple redundant paths. In the shortest path routing model, the potential energy values of the nodes on the paths are used to choose one path when several paths have the same cost as the shortest path.

3.2.4 ST number: After ear decomposition, the nodes in a domain will be renumbered according to the results of decomposition with spanning tree (ST) numbers, which are used to form two node-disjoint paths from source node to destination node.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

NNI	Network to Network Interface
PTDN	Public packet Telecom Data Network
QoS	Quality of Service
ST	Spanning Tree
TTL	Time To Live