

Recommendation

ITU-T Y.4234/F.742.3 (01/2025)

SERIES Y: Global information infrastructure, Internet protocol aspects, next-generation networks, Internet of Things and smart cities

Internet of things and smart cities and communities –
Requirements and use cases

SERIES F: Non-telephone telecommunication services
Multimedia services

Requirements, capabilities and deployment models for e-learning in remote classrooms

ITU-T Y-SERIES RECOMMENDATIONS

Global information infrastructure, Internet protocol aspects, next-generation networks, Internet of Things and smart cities

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Recommendation ITU-T Y.4234/F.742.3

Requirements, capabilities and deployment models for e-learning in remote classrooms

Summary

Recommendation ITU-T Y.4234/F.742.3 includes a concept of e-learning in remote classrooms, i.e. places where information and communication technology (ICT) infrastructure and e-learning facilities, such as digital connectivity, computers, computer applications, virtual collaboration, online and digital educational catalogues, are made available for learners to educate themselves.

There is a wide and rising disparity in access to quality education between remote and rural areas in most countries when compared to their urban counterparts. Various international organizations (e.g. the United Nations (UN) and the International Telecommunication Union (ITU)) and national bodies (such as ministries) worldwide have acknowledged the need for urgent and concerted efforts towards the fulfilment of the promise of universalization of education.

It is also very clear that the future of education is digital and immersive, and that the delivery of future education will be heavily dependent on access to appropriate (ICT) infrastructure and connectivity.

At the same time, there is a dire shortage of trained teaching staff, in both developed and developing countries, and the situation is much worse in the remote and underserved areas. In most of these places, there are very few teachers, only some of whom are capable of keeping pace with the demands of fast-evolving educational curriculums. In addition to education and learning, these remote areas are disadvantaged by a lack of access to other facilities, such as health and vocational capability development. New standards are required that bridge the digital divide and mitigate the growing disparity, by ensuring that more and more online services are delivered equitably to the remote and underserved areas.

This Recommendation describes the challenges and considerations for providing digital education to remote schools, and develops requirements, capabilities and deployment models to impart high quality e-learning services in remote classrooms in rural and remote areas.

History *

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Digital connectivity, digital divide, digital education tools, educational facilities, e-learning, hybrid classrooms, ICT infrastructure, remote classrooms, rural areas, underserved areas, virtual collaboration.

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FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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Recommendation ITU-T Y.4234/F.742.3

Requirements, capabilities and deployment models for e-learning in remote classrooms

1 Scope

There is a wide and rising inequality in access to quality education in remote and underserved areas around the world and the acknowledgement that immediate efforts are required for the fulfilment of the promise for the universalization of education. It is also very clear that the future of education is digital and immersive, and that delivery of that future education will be heavily dependent on access to appropriate information and communication technology (ICT) infrastructure and connectivity.

To bridge the digital divide, and to ensure that the most vulnerable in society are not increasingly denied access to services, new standards are required to address the digital divide and the threat of the growing disparity as more and more services are delivered online.

This Recommendation includes a concept of e-learning in remote classrooms, i.e. places where ICT infrastructure and e-learning facilities, such as digital connectivity, computers, computer applications, virtual collaboration, and online and digital content catalogues, are made available for willing learners to educate themselves by using said educational facilities.

This Recommendation includes:

- Challenges and considerations for education in remote and underserved areas;
- Concept and Internet connectivity scenarios for e-learning in remote classrooms;
- Requirements for e-learning in remote classrooms;
- Capabilities of remote classrooms to support e-learning; and
- Deployment models for remote classrooms to support e-learning.

Relevant use cases are provided in Appendix I.

NOTE 1 – Accessibility aspects related to persons with disabilities, persons with age-related disabilities and those with specific needs are out of the scope of this Recommendation.

NOTE 2 – Security and privacy-related requirements are outside the scope of this Recommendation. However, it is expected that the hardware, software and applications that may be used in the e-learning classrooms will handle data security and privacy-related requirements, as per applicable standards.

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.

- [ITU-T L.1700] Recommendation ITU-T L.1700 (2016), *Requirements and framework for low-cost sustainable telecommunications infrastructure for rural communications in developing countries*.