York Telecom Network (YTN) 101

Presentation to

Broadband Task Force

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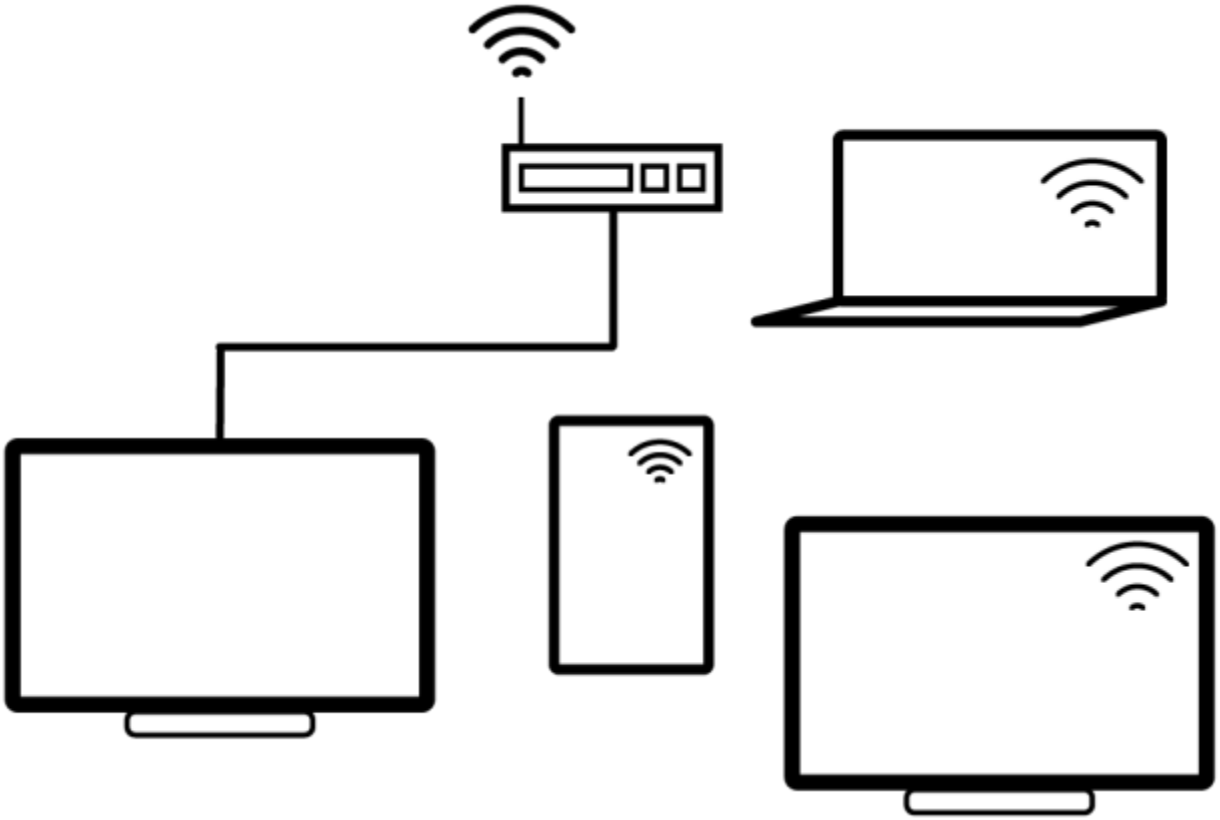
York Region


EVERYTHING
INTERNET OF THINGS

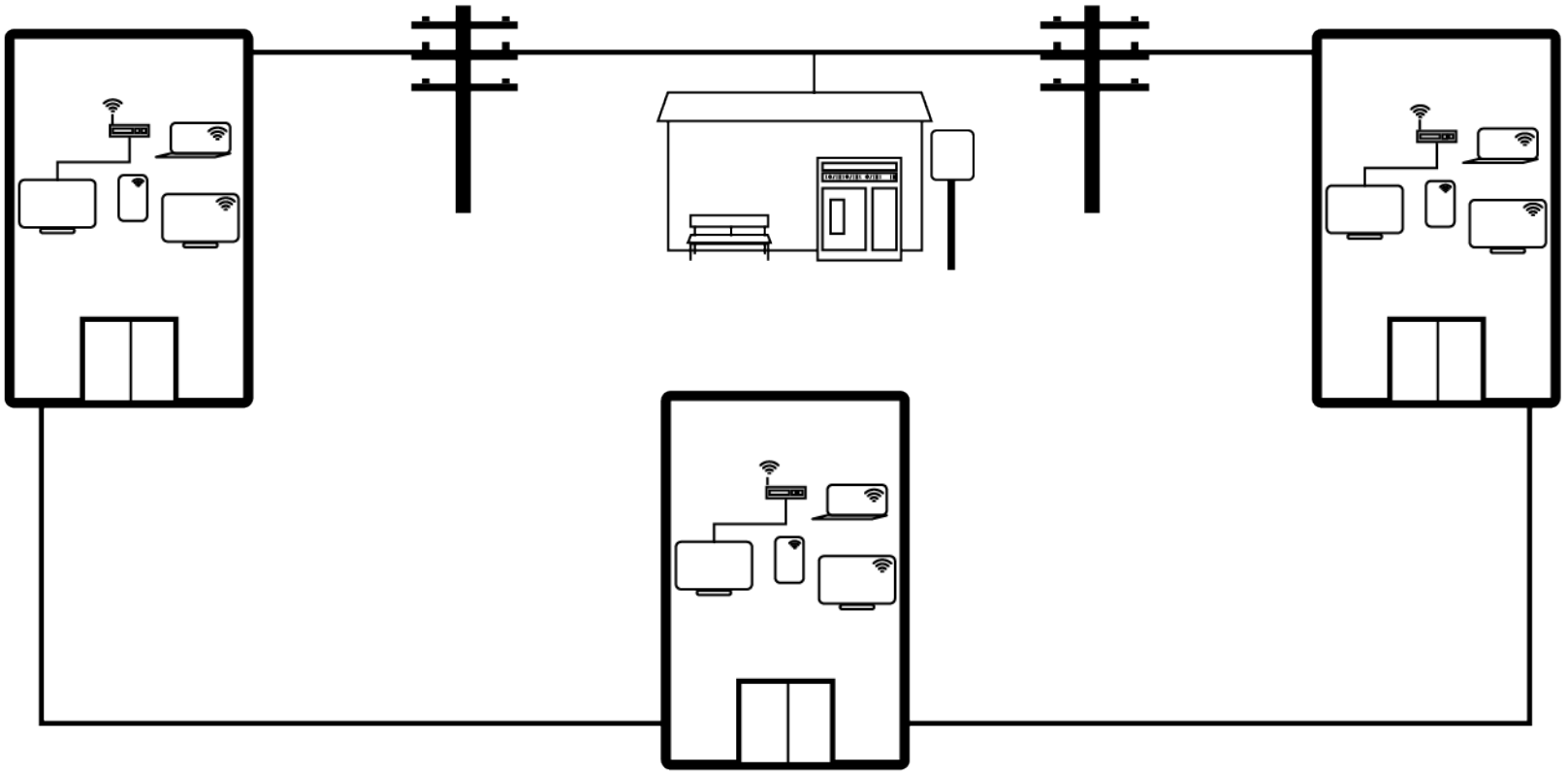
Networks

Local Area Network (LAN)



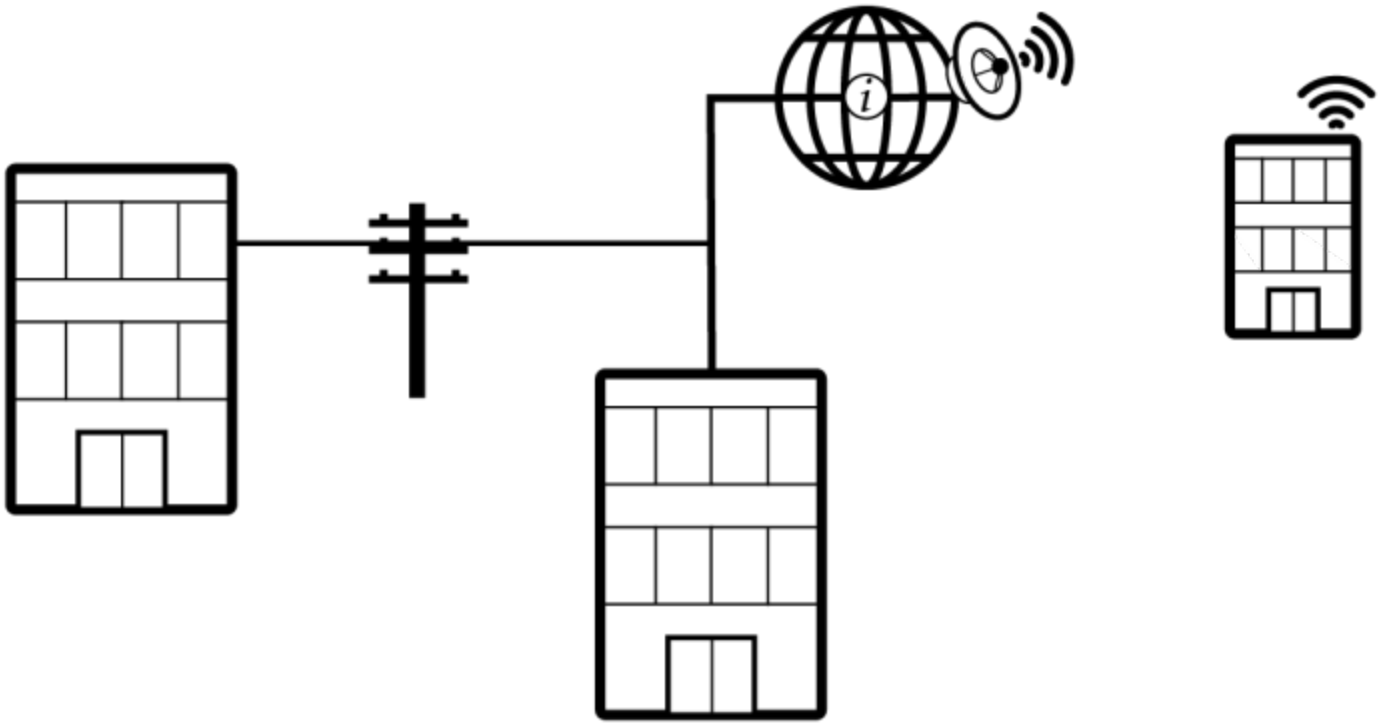
Local area networks provide computer-to-computer connections within a building.

Wide Area Networks (WAN)



Wide area networks provide building-to-building connections.

Connections in a Wide Area Network



Wide area networks often include both wired and wireless connections.

Broadband

- Any network connection that is
  - High-speed
  - Always connected

Broadband Connection Categories

Wireless

- Satellite
- Mobile (3G / LTE)
- Wi-Fi

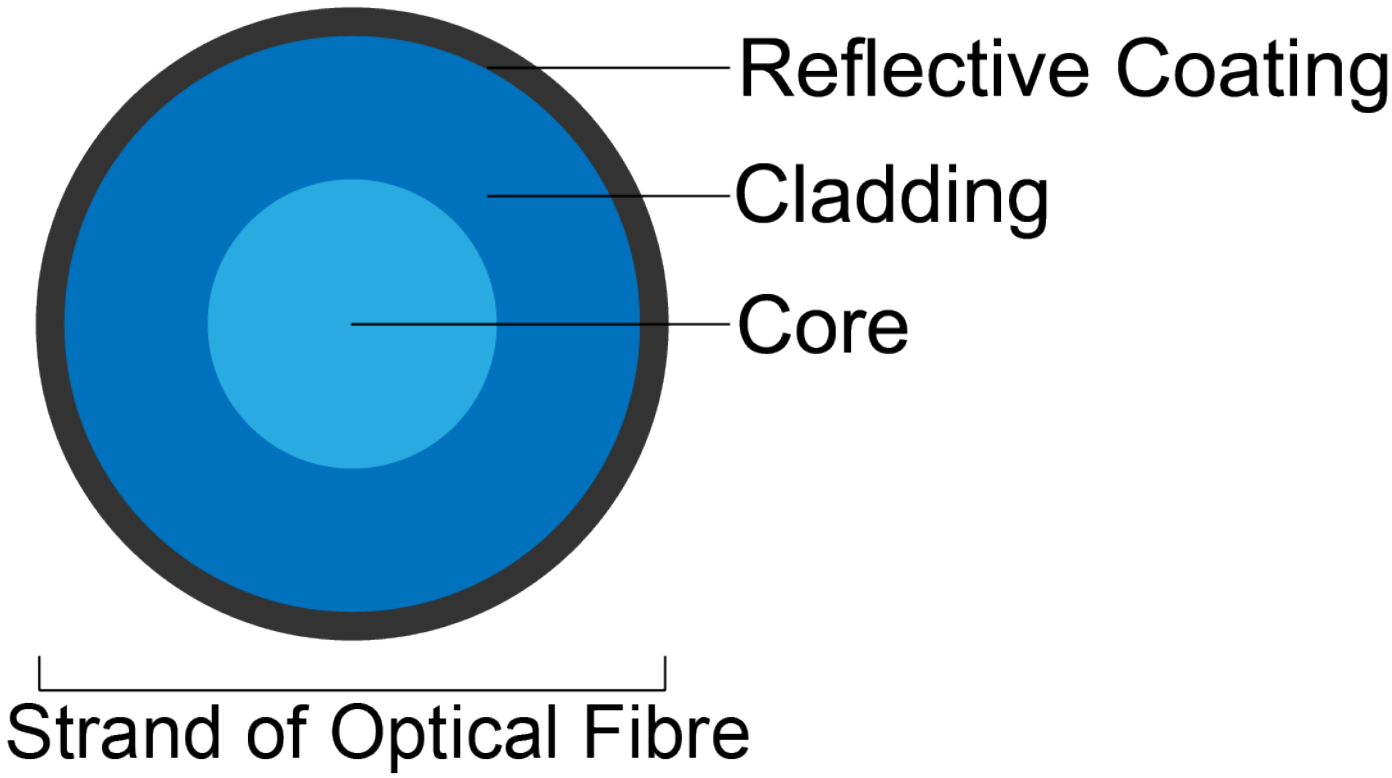
Wired

- DSL (telephone infrastructure)
- Cable (cable TV infrastructure)
- Fibre Optic

Networks can include any number of connection types from either category.

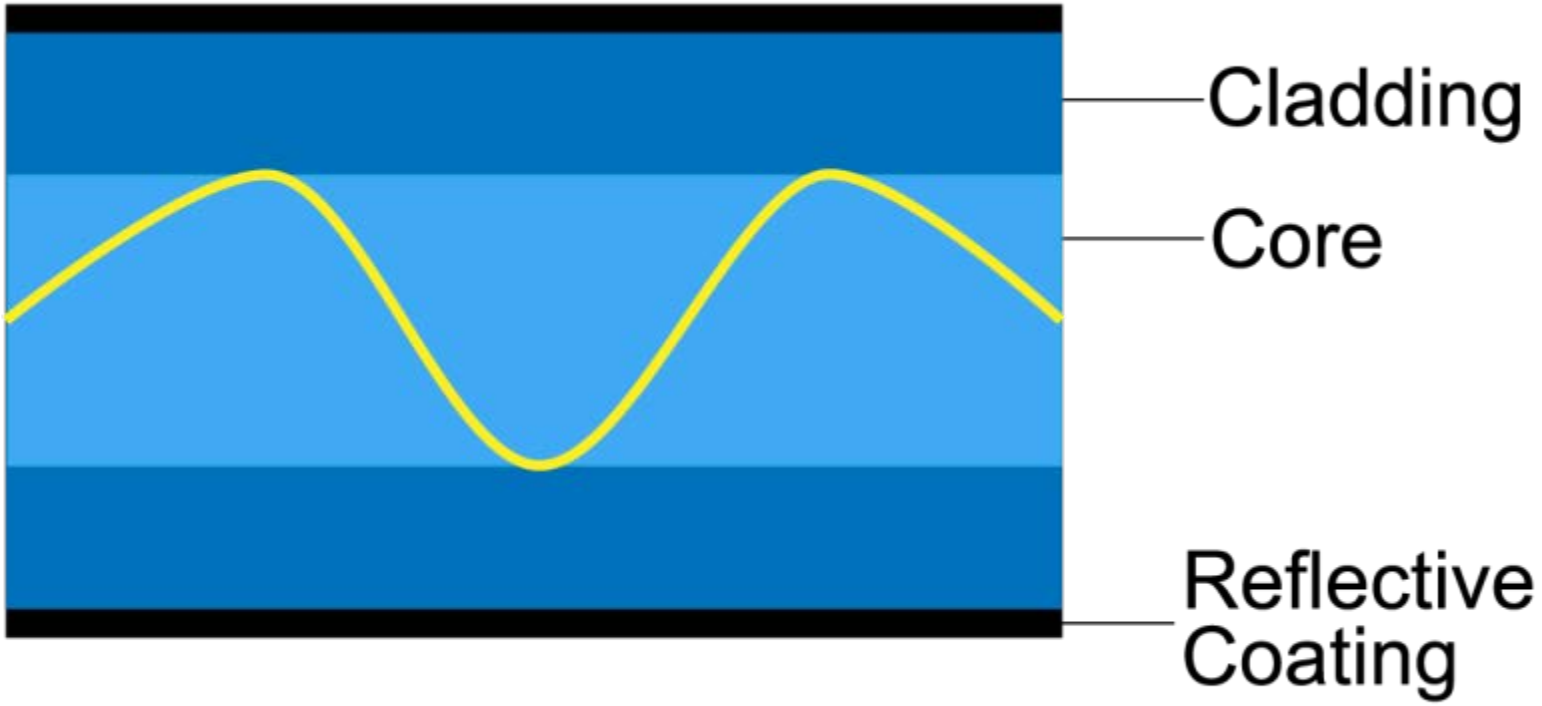
Fibre Optics

Optical Fibre



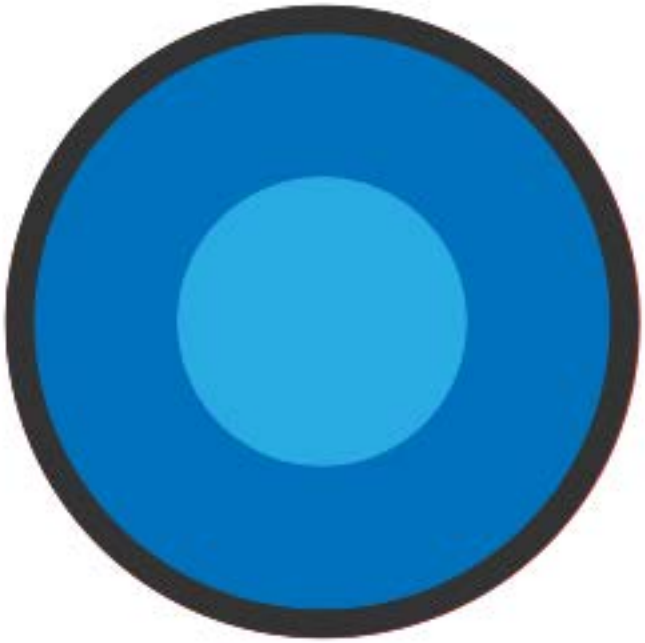
A strand of optical fibre has three layers. The core transmits light, and the cladding and reflective coating prevent light from escaping.

Light in an Optical Fibre



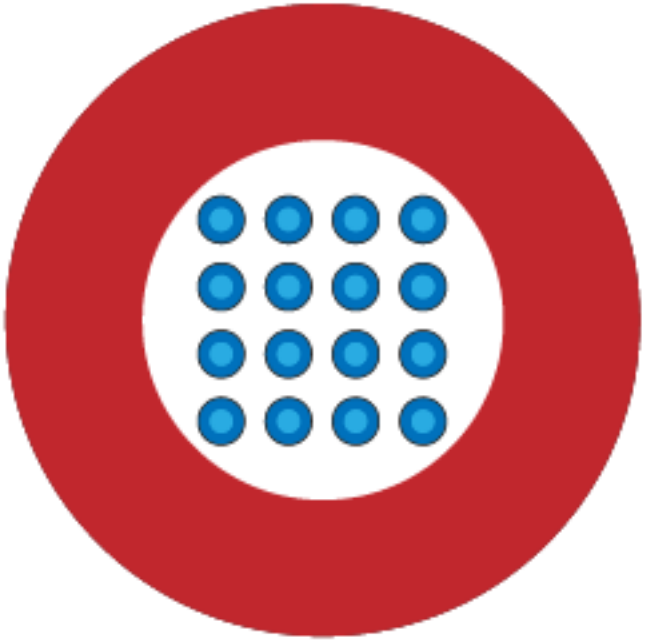
The cladding and reflective coating help light travel through the core without escaping.

Bundles of Optical Fibre



Strands of optical fibre can be bundled together, and surrounded by a protective covering.

Fibre Optic Cable



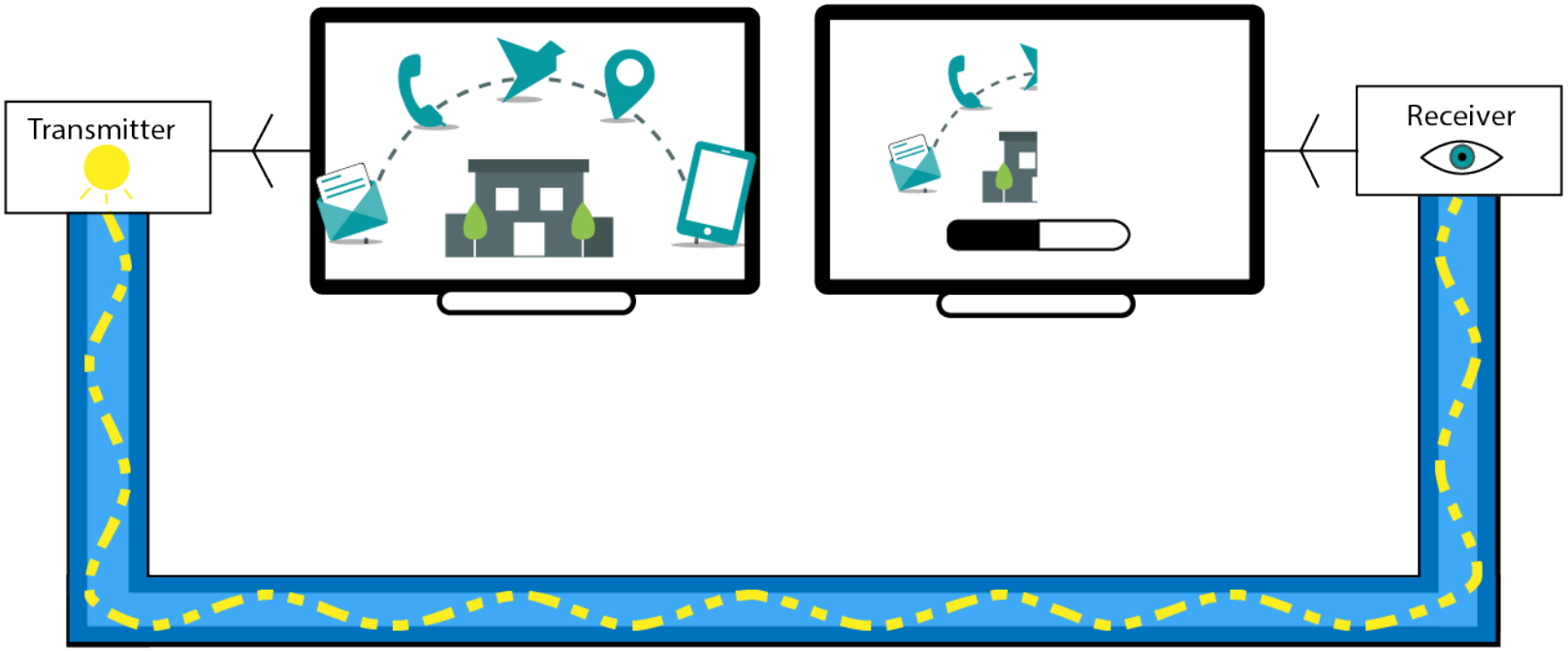
One fibre optic cable can hold hundreds of strands of optical fibre. Typical fibre optic cables hold up to 144 strands.

Fibre Optic Capacity

Bit (b)	= Machine-to-machine (M2M) communication (1s & 0s)
Byte (B)	= Physical storage
1 Byte	= 8 bits
1 Kilobyte (kB)	= 1000 B
1 Megabyte (MB)	= 1000 kB
1 Gigabyte	= 1000 MB
1 Terabyte	= 1000 GB
1 Petabyte	= 1000 TB
	= 10^{15} Bytes

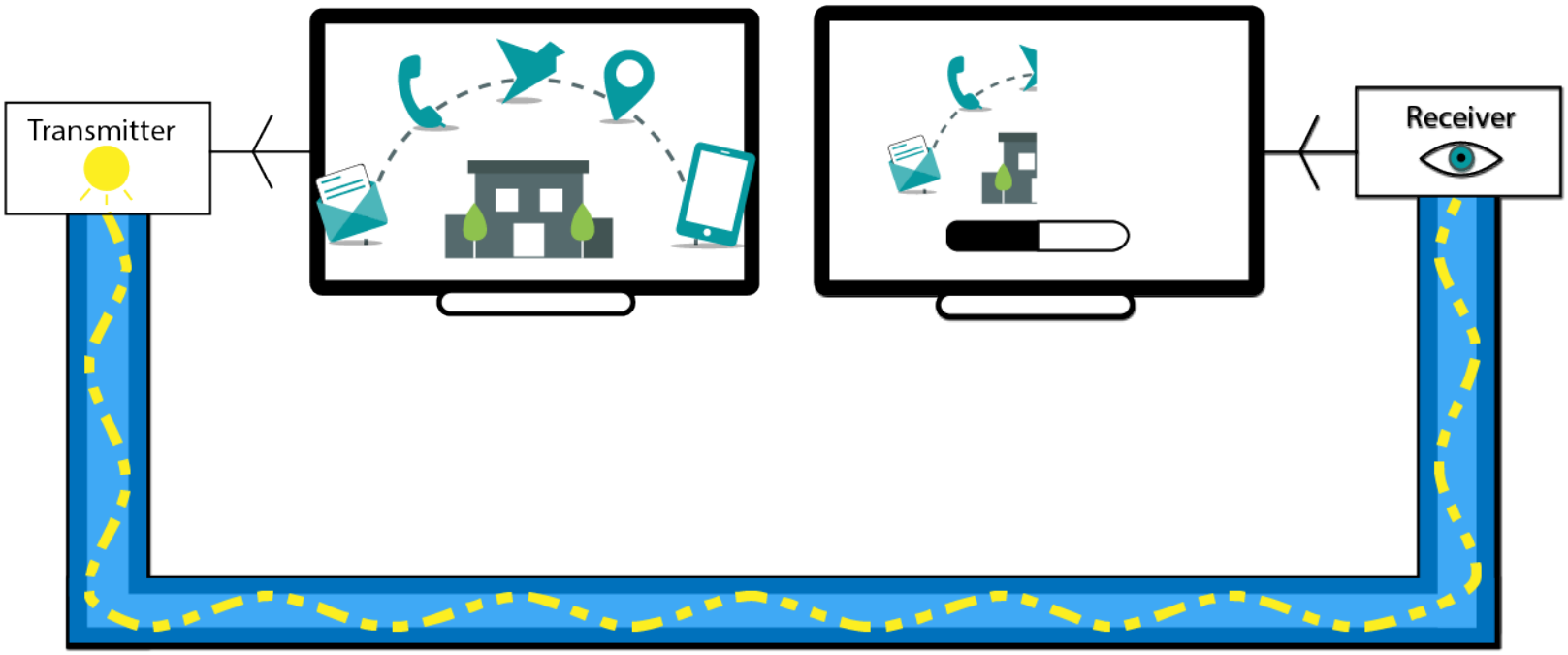
Fibre optic cable has almost unlimited capacity.

Fibre Optic Communication



Network equipment sends information through strands of optical fibre as flashes of light.

Dark Fibre



Dark fibre is the ‘un-lit’ strands of fibre optic cable – similar to an empty pipe.

Dark Fibre

An optical fibre is described as “dark fibre” if:

- There is no network equipment attached
    - Or
- The fibre is leased out to a subscriber who provides their own network equipment

Dark fibre can be lit and used by the owner or leased to others.

York Telecom Network is Dark Fibre

- The YTN is a dark fibre network
- Subscribers need to attach their own network equipment to use the connection

The YTN currently provides the network infrastructure, not network services.

Story of the York Telecom Network

2002 – Modest Beginning

Connecting Regional buildings

- Link required between two Region buildings
- Our own fibre was most cost-efficient
- Managed within modest existing IT Services resources

The YTN is the physical infrastructure of Fibre Optic cable owned by the Region.

2009 - York Region Network Plan

Identified the benefits of a single “cross Region network”

- Connections between Regional buildings
- Connections between Regional ‘things’
    - Traffic controls & cameras
    - VIVA monitoring & payment systems
    - Water & wastewater SCADA systems

The York Region Network Plan is an internal document that led to YTN growth to support departmental needs.

2011 – Local Municipal Subscriptions Began

- First subscription
  - YTN was being installed close to other public sector buildings in Newmarket
  - Opportunity for the Town of Newmarket to add their own connections at lower than market value
  - Opportunity for the Region to offset some operating costs by adding subscribers

The Town of Newmarket became the YTN's first subscriber in 2011.

2013 – Acquired Carrier's License

Non-Dominant Carrier's License

- Acquired based on external legal opinion
- Allows the Region to add public subscribers
- Region does not have any significant impact on competition

Non-Dominant Carrier's License acquired with CRTC in order to 'provide telecommunications services to the public for compensation'.

2015 – ORION Link

- Ontario Research and Innovation Optical Network (ORION) Link between York University and Southlake Regional Health Centre

- Purchased 2 strands of dedicated dark fibre

ORION link facilitates post-secondary research and presence in York Region.

York Telecom Network – Summary

Completed by the end of 2014:

- 79.6 km of cable installed
- 130 Connections
  - 50 Buildings
  - 80 other connections

The YTN has evolved from a small asset connecting Regional buildings, to a complex business with subscribers and multiple connection types.

York Telecom Network – Summary (continued)

Current Subscribers

- Town of Newmarket (15 locations)
- Town of Georgina (2 locations)
- Town of Richmond Hill (3 locations)
- Town of Aurora (9 locations)
- YRDSB (2 locations)
- York Regional Police (6 locations)

Six public sector subscribers currently connect to the YTN.

Broadband Strategy

Broadband Value within a Community

Availability of broadband internet is linked to economic development

- Attracts businesses
- Creates jobs, increases productivity, promotes innovation
- Promotes rural employment and wage growth

Broadband connectivity is important to York Region's economic development.

Broadband Strategy

Education & Advocacy Priorities	Municipal Process Priorities	Infrastructure Investment Priorities
Government Engagement	Harmonize Municipal Access Agreements	ORION PoP at Southlake & York Region Research and Education Network
Development Industry Engagement	Development Approval Process	
Property Management Engagement	Wireless Communications Toolkit	Community Wi-Fi Network
	Regional Conduit Network	Low-Cost Internet for Social Housing
		Regional WAN Connectivity

Broadband Strategy Vision:

To establish York Region as a Gigabit Region, recognized for its leadership in fostering an eco-system of collaboration in business innovation within a connected lifestyle community.

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The YTN was identified through the Broadband Strategy as one of the assets that could potentially play a role in Regional connectivity.

2014 – York Telecom Network Review

Regional staff initiated a comprehensive review due to:

- Increasing interest from potential subscribers,
- The costs and risks of an expanded YTN, and
- Issues related to governance

- YTN Review began in 2014
- Many activities related to the YTN were put on hold pending the review

Regional staff recognized the need to stop and assess the YTN to ensure its future direction was in the best interest of the Region and its stakeholders.

Review Format

Review being carried out in 2 phases:

- Phase 1: Current state analysis and assessment of potential business / governance models
- Phase 2: Development / implementation of a detailed business plan and governance model

The ownership and governance of the YTN will change as a result of the review.

Phase 1 Format

Three deliverables:

1. YTN Assessment Report
2. Stakeholder consultations
3. Business / Governance Model Review

Phase 1 is a detailed assessment of the YTN that includes three deliverables.

Potential Governance Models

Public-Public		Public-Private			Privatize/Divest	
Region Only	Region + Local Municipalities	Public-Private Joint Venture	DBFMO	Concession	Single Owner	Broad Ownership
Models include regulated utility, Region-owned non-profit or standalone entity Region largely maintains control Region fully bears risks	Similar to Region only, but with joint local municipal ownership More complex governance Business case must make sense for each partner as well as whole entity	Joint ownership with private sector Need to divide ownership and risks between partners Identify potential government funding sources	Private sector designs, builds, finances, maintains and operate; Region retains rights to revenues Likely limited flexibility unless built and priced into contract	Private entity given concession rights to run business Requires consideration of business case, rates to be charged Limited flexibility	Sale to private entity Pricing to Region becomes fully commercial (may be negotiated as part of sale) Risks transferred to private owner	Sale to consortium Pricing to Region becomes fully commercial (may be negotiated as part of sale) Risks transferred to private owner.

The third component will involve a detailed analysis of each option, and will leverage the findings from components one and two.

Phase 1 - Outcome

- Recommended governance model and business plan for the YTN
- Findings will be brought to the Broadband Task Force for discussion
- Recommendations will be brought to Council

The review was undertaken to enable Council to inform the future direction of the YTN.

Phase 2

- Implementation of selected business plan and governance model
- Format to be determined after Phase 1 is complete

Phase 2 is dependent on the result of Phase 1.

Summary

- Quick tour of technology
  - Local area networks (LAN)
  - Wide area networks (WAN)
  - Broadband connections
  - Fibre optics
- The story of York Telecom Network
- Where we are now
- Next steps

Discussion / Q&A

York Region