

**ETHIOPIA 2050:**

**ICT INFRASTRUCTURE GRAND  
CHALLENGES AND PROPOSED  
SOLUTIONS**

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# Societal Grand Challenges that could be Addressed with Technology



CLEAN WATER



FOOD PRODUCTION



PUBLIC SAFETY AND SECURITY



HEALTHCARE SERVICES



EDUCATION AND EMPLOYMENT



GOVERNANCE AND PUBLIC SERVICE



ACCESS TO FINANCING



RISKS AND REGULATIONS



TRANSPORTATION



ENVIRONMENT



URBANIZATION

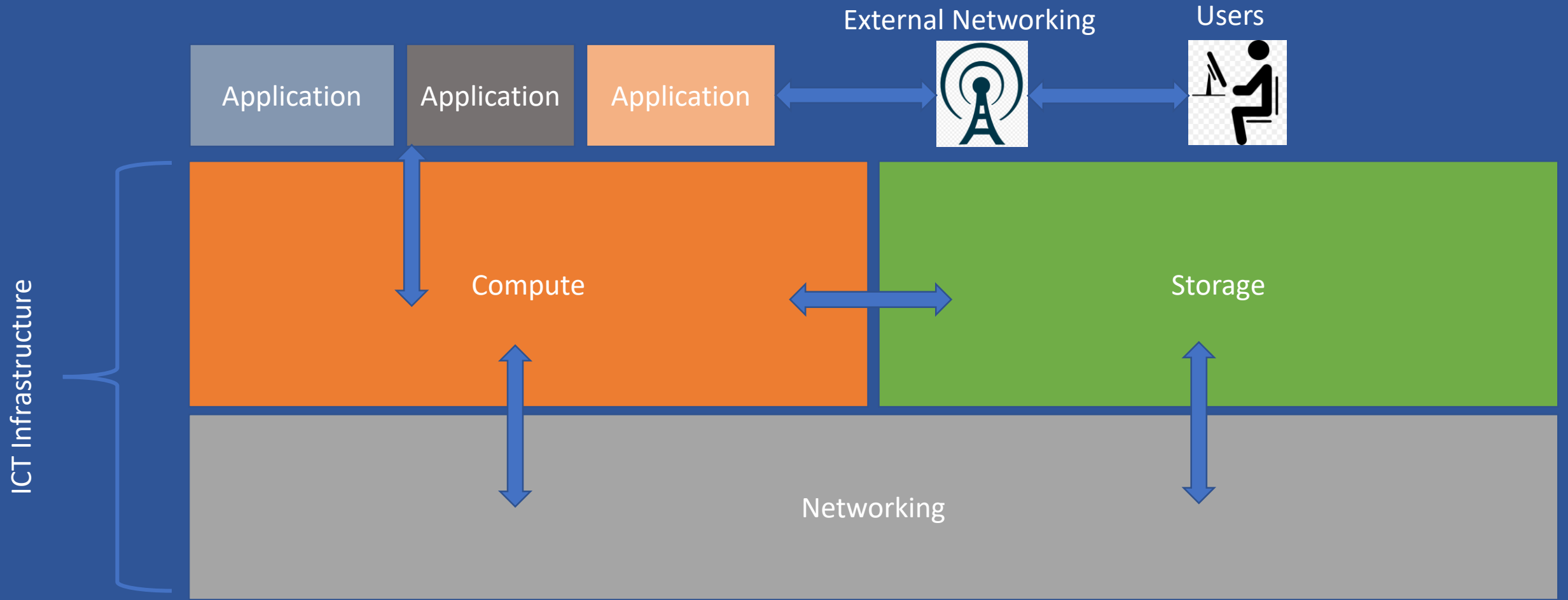


ENERGY

# The Future and Technology Infrastructure

- 100+ million domestic and international individual, business, and institutional users
- ICT will play a determinant role in meeting the grand challenges
- A reliable, available, secure, scalable, and fast infrastructure is critical

# ICT Infrastructure Components

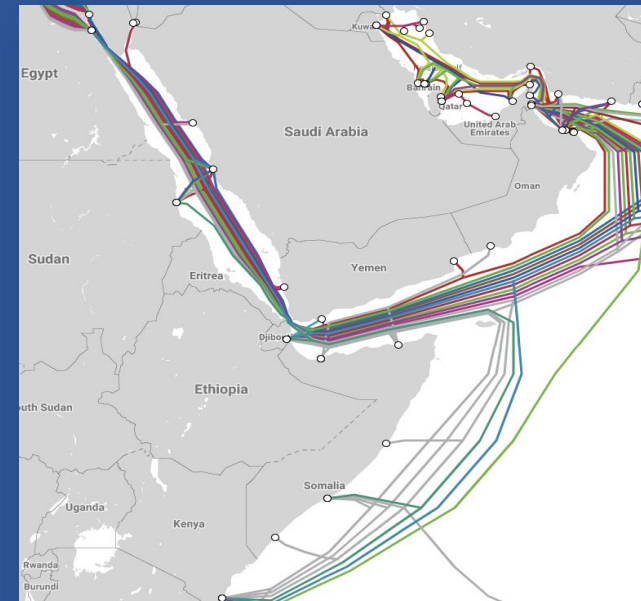
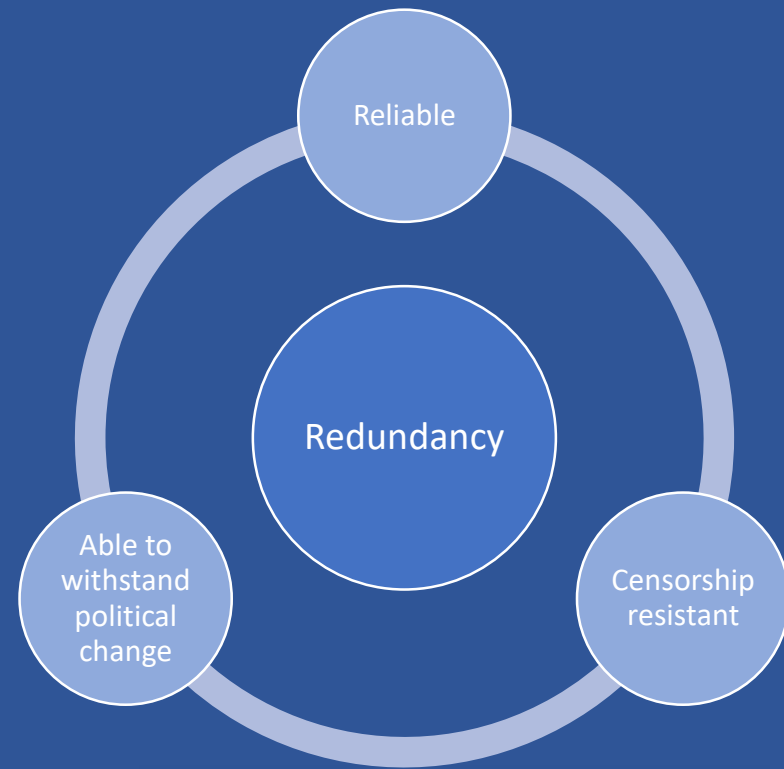


# Networking: Current Challenges

- Low coverage, low bandwidth, low speed, high latency, unavailable
- Single provider, outdated, insecure, government owned
- Not enough skilled, experienced people, low innovation
- Unexpected disruption, customer support, incident response

# Networking: Solutions

- Requirement: A highly available and scalable network backbone that has good connectivity with networks outside of the country
- Build peering points within Ethiopia that have connectivity neighboring countries
- Build out “last-mile” to businesses/citizens: Cable, DSL, wireless (plan to upgrade to 5G)
- Initially, expect most traffic to be international egress
- Part or full privatization of Ethio telecom
- License additional providers



# Compute: Current Challenges

- All on prem, difficult to acquire HW and implement
- Outdated HW and SW, disparate, not scalable, and insecure
- Not enough skilled, experienced people, no innovation
- Unexpected disruption, customer support, incident response

# Compute: Solutions

- Increasing trend in “Cloud Computing”
  - Economies of scale: Large data centers operated by big tech companies; resources rented to business customers; pay according to usage; various levels of abstraction
- Amazon, Microsoft, Google, Ali Cloud, Oracle all run various datacenters worldwide
  - Of interest: South Africa, UAE
- Recommendation:
  - Short-term: Provide reliable network infrastructure for access to existing cloud datacenters from within Ethiopia
  - Long-term: Incentivize build-out of compute infrastructure within Ethiopia



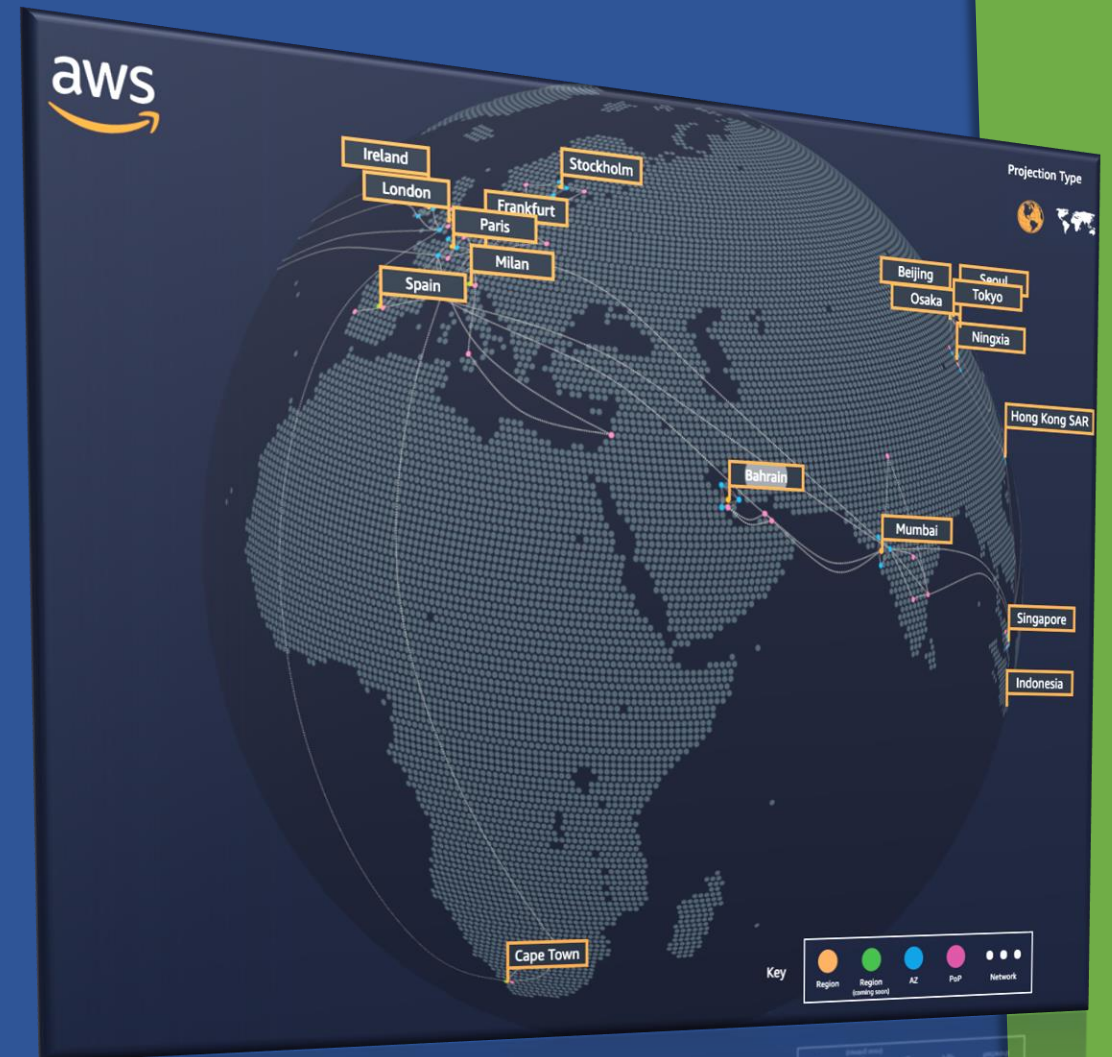


# Storage: Current Challenges

- Low capacity, low IO, difficult to scale
- Expensive BCDR and archiving, insecure.
- Not enough skilled, experienced people, no innovation
- Unexpected disruption, customer support, incident response

# Storage: Solutions

- A high capacity, reliable and scalable storage service facilitating fast read and write performance is essential for a healthy ecosystem of modern compute applications
- Use of new technologies—such as machine learning upon big datasets, virtual reality, high resolution photography—are causing continually increasing storage demand
- Like compute resources, storage is also provisioned as a cloud service by the same large multinational companies with various abstractions offered



# Conclusion



Building reliable, available, scalable and secure infrastructure is capital intensive and requires highly skilled engineers



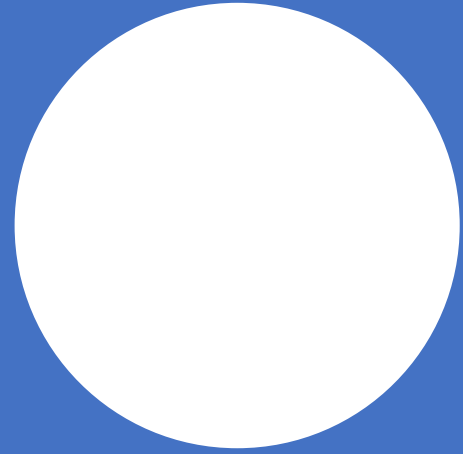
Incentivize innovation by technologically capable private corporations



Private corporations are typically incentivized to maximize the extraction of revenue from the systems they create and to divert that revenue to shareholders



Create a regulatory environment that is mutually beneficial to both the innovating corporations and Ethiopia

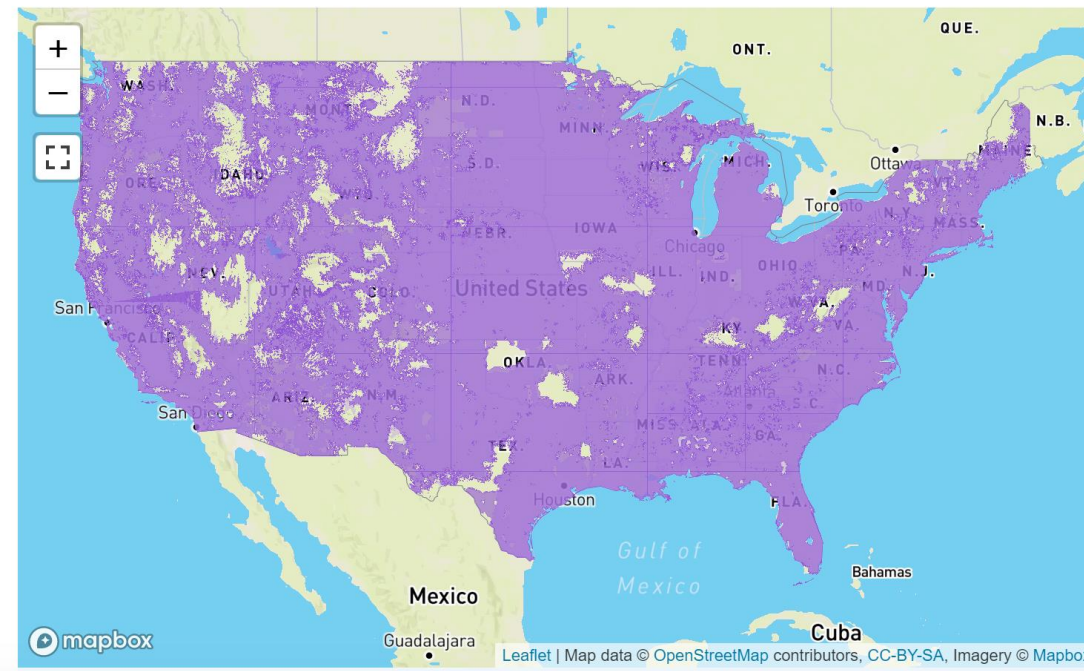


Thank you

# APPENDIX – VERIZON – LANDMASS COVERAGE

## How Verizon's Coverage Compares

Don't take our word for it when it comes to Verizon's reception—just take a look at the map below. Click on each carrier to get a look at their national 4G and 3G coverage. You can also zoom in to see what coverage is like in your specific area.



# APPENDIX – VERIZON – WIRELESS SPEED

Network	Download speed	Upload speed
<b>5G UWB</b>		
-- 5G Home	300 Mbps*	50 Mbps
-- Mobile	450 Mbps**	50 Mbps
<b>4G LTE</b>	5-12 Mbps***	2-5 Mbps
<b>3G Ev-DO</b>		
-- With Ev-DO Rev A devices	600 Kbps - 1.4 Mbps	500 - 800 Kbps
-- With Ev-DO Rev 0 devices	400-700 Kbps	60-80 Kbps

\* Depending on location, max speeds up to 940 Mbps. 4G LTE backup.

\*\* With peak speeds of nearly 1 Gbps.

# APPENDIX – VERIZON WIRED SPEED

Speed tier	Download speed	Upload speed	Latency
25/25 Mbps	30.13 Mbps	26.50 Mbps	11.61 ms
50/50 Mbps	57.65 Mbps	62.23 Mbps	10.67 ms
75/75 Mbps	83.89 Mbps	84.16 Mbps	10.29 ms
100/100 Mbps	102.16 Mbps	116.58 Mbps	8.06 ms
150/150 Mbps	151.74 Mbps	158.32 Mbps	6.51 ms
300/300 Mbps	303.59 Mbps	328.30 Mbps	Not available
500/500 Mbps	511.98 Mbps	530.99 Mbps	Not available
<b>Gigabit Connection (up to 940/880 Mbps; avg. speeds between 750-940 / 750-880 Mbps)*</b>	947.74 Mbps*	916.26 Mbps*	6.84 ms*

# APPENDIX – VERIZON LATENCY

Monthly latency figures of:

- **45ms or less** for regional round trips within North America.
- **30ms or less** for regional round trips within Europe.
- **90ms or less** for transatlantic round trips between London and New York.

Packet delivery of:

- **99.5 percent or greater** for regional round trips within Europe and North America.
- **99.5 percent or greater** for transatlantic round trips between London and New York.

Verizon Enterprise Latency Statistics (ms)												
	2019											2018
	October	September	August	July	June	May	April	March	February	January	December	November
Trans Atlantic (90.000)	70.545	70.573	70.526	70.460	73.833	69.986	69.950	69.930	69.965	69.888	70.531	70.965
Europe (30.000)	11.901	11.452	11.459	11.194	10.978	11.706	11.234	10.592	11.099	11.478	10.954	10.070
North America (45.000)	30.526	29.767	31.340	31.396	30.927	31.352	31.531	33.523	33.782	36.083	36.084	39.243
Intra-Japan (30.000)	11.282	11.312	11.141	11.323	-	11.221	11.932	13.093	12.910	12.761	12.616	12.894
Trans Pacific (160.000)	101.320	99.414	99.400	99.399	134.714	99.336	99.320	99.238	99.237	99.242	99.240	99.250
Asia Pacific (125.000)	87.403	86.799	84.617	85.959	90.206	85.806	85.201	85.119	86.840	86.726	98.990	87.173
Latin America (140.000)	85.169	92.174	90.459	95.394	93.080	90.968	88.450	87.782	119.633	-	-	-
EMEA to Asia Pacific (250.000)	119.666	119.691	118.336	118.655	122.317	144.462	119.350	119.239	118.699	116.281	115.876	115.030