



Healthcare Challenges

Connectivity Solutions

Peg Molloy
President & CEO



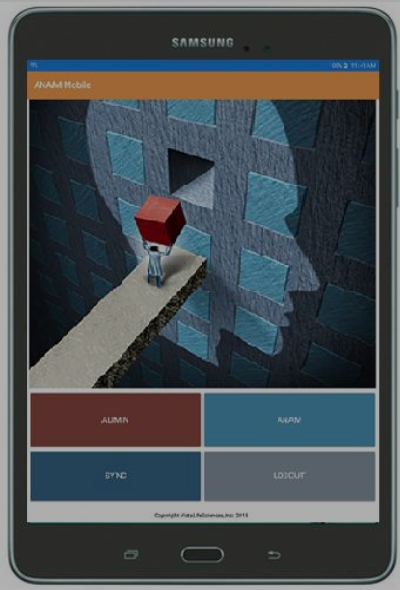
VistaLifeSciences

Disclosure



VistaLifeSciences

Products used in 21 countries and on the International Space Station



Cognitive
Behavioral Health



Clinical Pathways
for Care



Data Management
Analytics, AI



The Problem: Chronic Disease

Top 7 Diseases = \$1 trillion annually*

45% of population effected

....we ALL pay for this

With care = 40% cost reduction

* Milken Institute

Healthcare Access

Chronic Disease

Cardiovascular disease

Diabetes

Arthritis and back pain

Alzheimer's disease

Cancer

Asthma

Other...e.g., Depression

Connectivity

Mobile medical care

Virtual medical care

Electronic health records

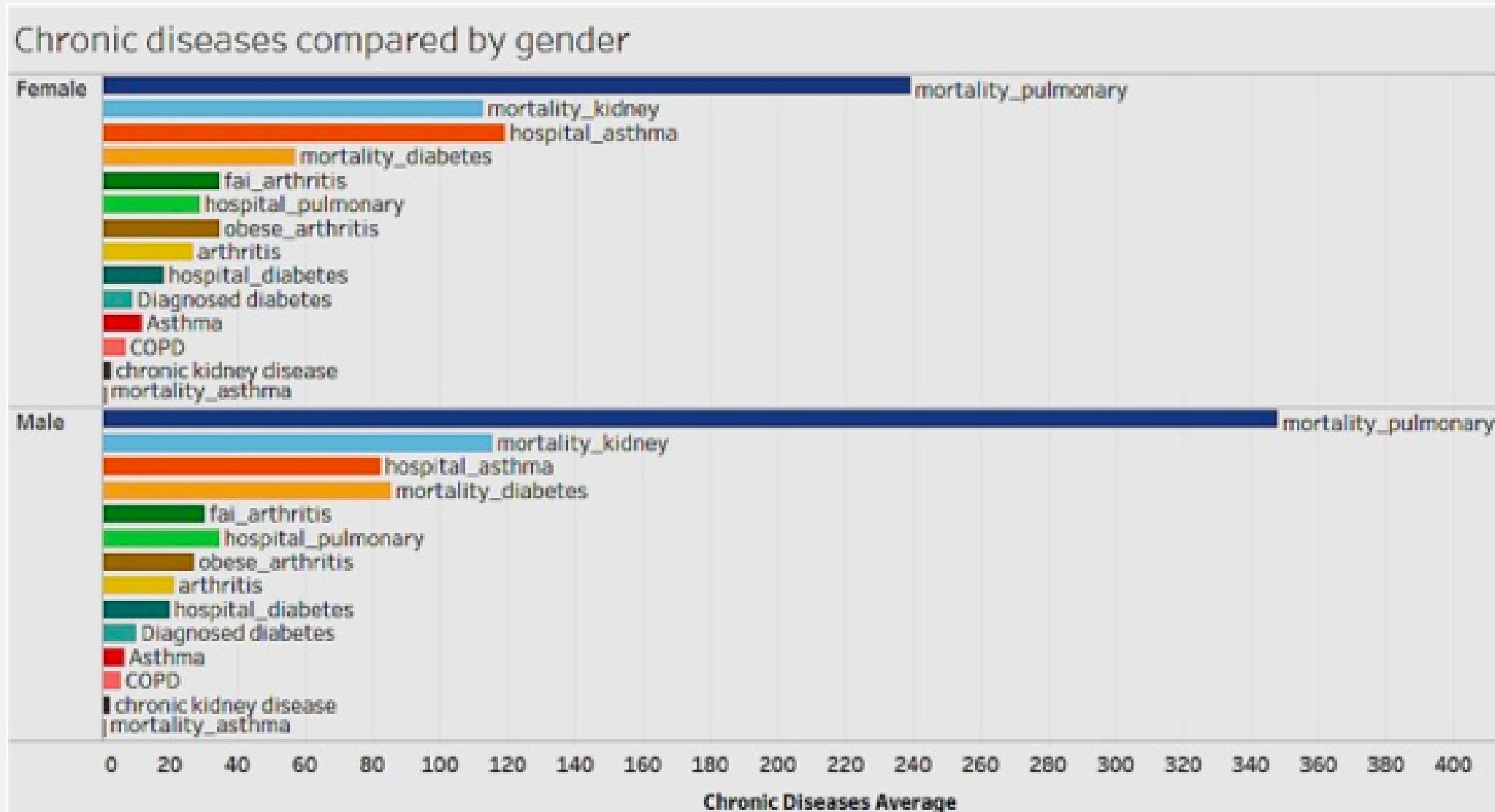
Wearable devices

Home healthcare

Remote patient monitoring

Compliance assistance

Chronic Disease in Men and Woman*



* [An Empirical Study of Chronic Diseases in the United States: A Visual Analytics Approach to Public Health](#)

Wullianallur Raghupathi, Viju Raghupathi, Int J Environ Res Public Health. 2018 Mar; 15(3): 431.

Providers

- Telemedicine access points
- Mobile provider
- Single physician
- Small physician practice
- Nursing home
- Rural health clinic
- Clinic/large physician group
- Hospital
- Academic/large medical center

The Office of the National Coordinator for Health
Information Technology (ONC)

What Do They Need to Do?



practice management
email, web resources
simultaneous use of EHR & high-
quality video consultations
non real-time image
downloads
remote monitoring
HD video consultations
real-time image transfer
continuous remote
monitoring
simultaneous EHR, HQ video
consultations

How Many Megabits Per Second (Mbps)?*

| | |
|------------------------------------------------------|------------|
| Residences | 4 Mbps? |
| Single Physician Practice | 4 Mbps |
| Small Physician Practice (2-4 physicians) | 10 Mbps |
| Nursing home | 10 Mbps |
| Rural Health Clinic (approximately 5 physicians) | 10 Mbps |
| Clinic/Large Physician Practice (5-25 physicians) | 25 Mbps |
| Hospital | 100 Mbps |
| Academic/Large Medical Center | 1,000 Mbps |



* The Office of the National Coordinator for Health Information Technology (ONC)

Imaging, Medical Consultation Requirements

Storage Requirements for Radiological Studies

| Modality | Uncompressed | | Lossless Compressed 2.5 to 1 | |
|-------------------------------------------------|--------------------|-------------|------------------------------|-------------|
| | MB per Study (Avg) | GB per Year | MB per Study (Avg) | GB per Year |
| Angiography | 15 | 45 | 6 | 18 |
| CR and DR | 42 | 2,688 | 17 | 1,075 |
| CT | 52 | 1,040 | 21 | 426 |
| MR | 39 | 195 | 16 | 78 |
| Nuclear Medicine | 1.3 | 3.9 | 0.5 | 1.6 |
| Ultrasound | 18 | 90 | 7 | 36 |
| Total Terabytes (TB) per 100,000 studies | 4.1 TB | | 1.6 TB | |

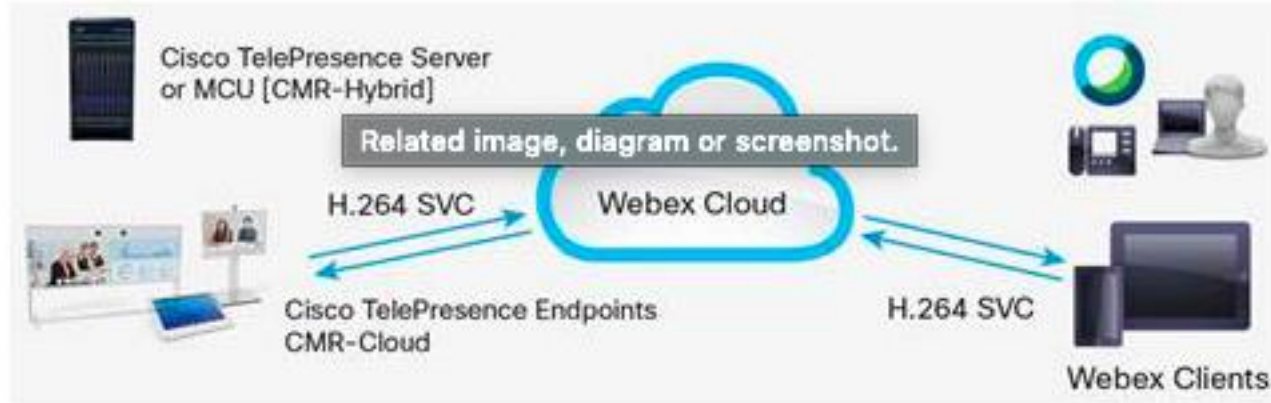
Source: Edward M. Smith, "Storage Management: What Radiologists Need to Know," *Applied Radiology*, 38(5) 13-15.

CISCO Webex Without Telepresence Participants



Application Complexity Drives Bandwidth

CMR Hybrid and CMR Cloud Connecting to Cisco Webex Clients



| | Main Video: Common Layer between Webex and Telepresence Applications | Data Sharing: As seen by Webex Client | TX Bitrate for Webex Client in CMR meeting (desktop) | RX Bitrate For Webex Client in CMR meeting (desktop) | Note: TX is generally higher than RX. Actual bandwidth used is typically much lower; however, clients must test as capable of these limits |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Webex users can see and hear telepresence users above this point | HD/720p | 1080p [*] (w/Conductor, Hybrid only) | 4.0+ mbps | 3.5 mbps | CMR Hybrid only, Cisco TelePresence Conductor required Source of presentation must be 1080p (16:9) |
| | HD/720p | 720p (5 or 1 fps) | 3.5+ mbps | 3.0 mbps | Source of presentation must be sharing at least 720p (16:9) |
| | 360p ^{**} | 720p (5 or 1 fps) | 2.5+ mbps | 2.0 mbps | |
| | 180p | XGA | 1.3+ mbps | 1.3 mbps | Lowest level for Webex client to receive main video from telepresence application |
| Video Floor: Below this level, no main video channel is sent between Webex and telepresence applications. Communications between Webex applications and those between telepresence applications operate normally. | | | | | |
| Webex to Webex only | <none>/90p Receives low bandwidth warning | XGA | 0.8+ mbps | 0.8 mbps | Dropped from main video channel (will retest to re-enter); can still send and receive 90p with other WebEx clients but receives low bandwidth warning when a telepresence is the active speaker. Frames will begin to be sacrificed in the data channel, and freezing can begin to occur. |

Lowest WebEx client above the floor sets common experience

TP to TP only

Access Saves Lives

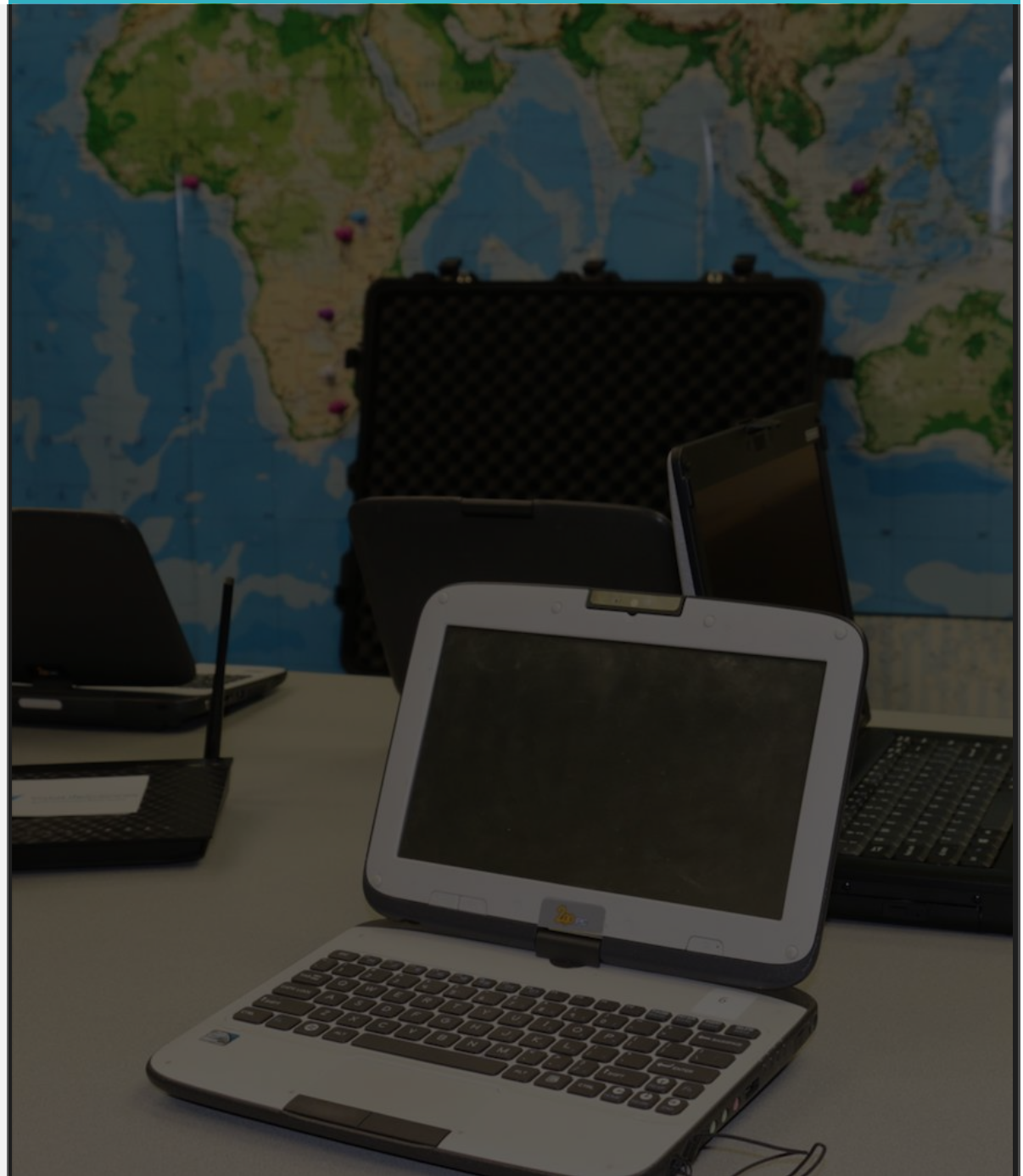
Deliver what is possible

Make it easy to use

Make it affordable

Partner with providers

Partner with communities



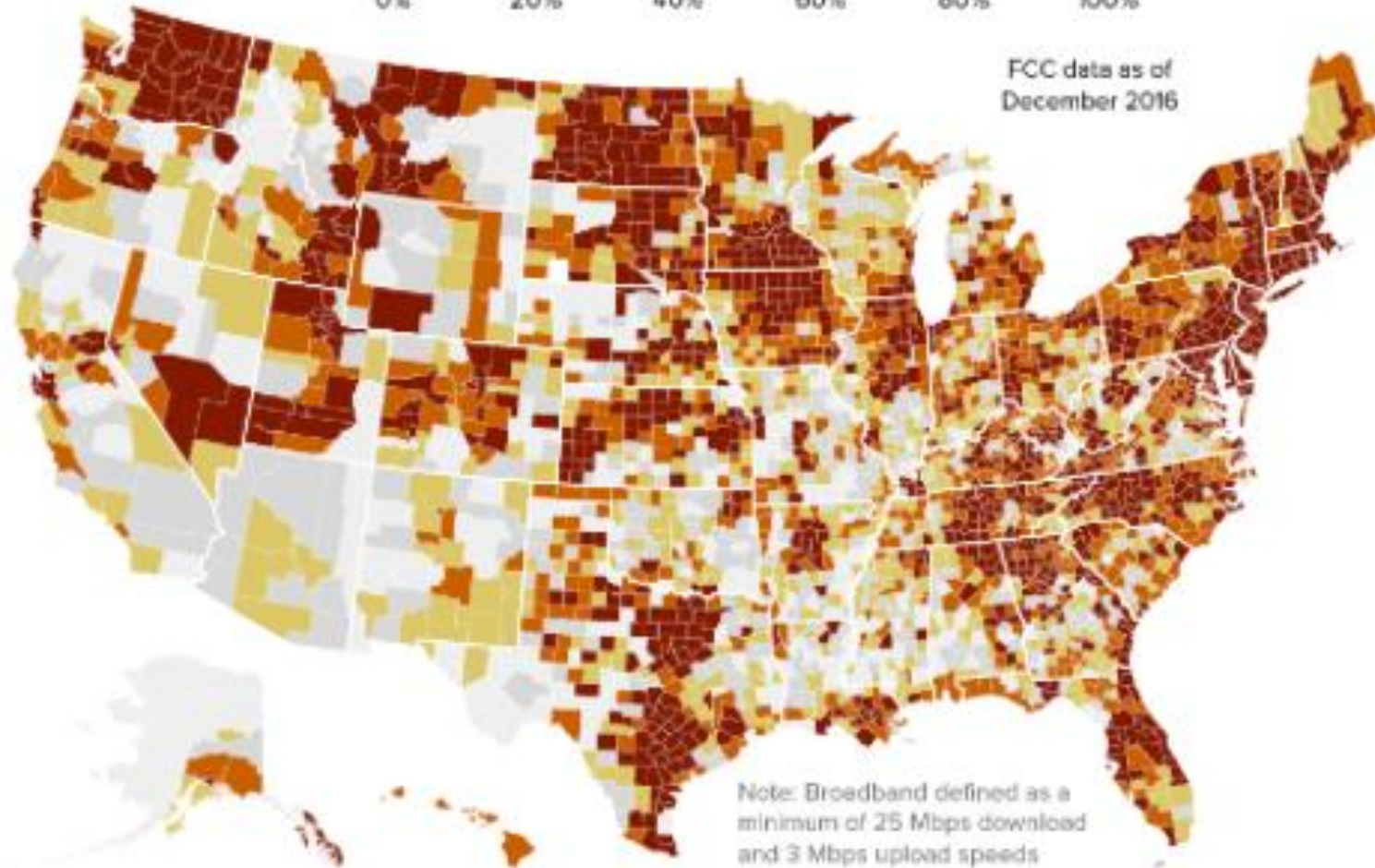
Where...*Urban, Rural, Everywhere*

Which U.S. counties have access to rural broadband?

Share of rural residents with fixed broadband internet access



FCC data as of
December 2016



Note: Broadband defined as a minimum of 25 Mbps download and 3 Mbps upload speeds