

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA**

IN THE MATTER OF THE APPLICATION
OF NATIVE AMERICAN TELECOM, LLC
FOR A CERTIFICATE OF AUTHORITY TO
PROVIDE LOCAL EXCHANGE SERVICE
WITHIN THE STUDY AREA OF
MIDSTATE COMMUNICATIONS, INC.

Docket No. TC11-087

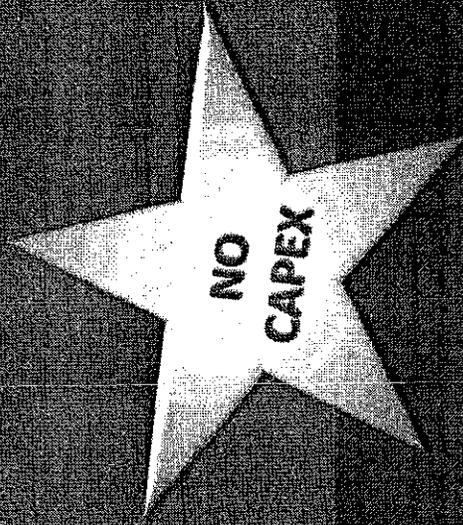
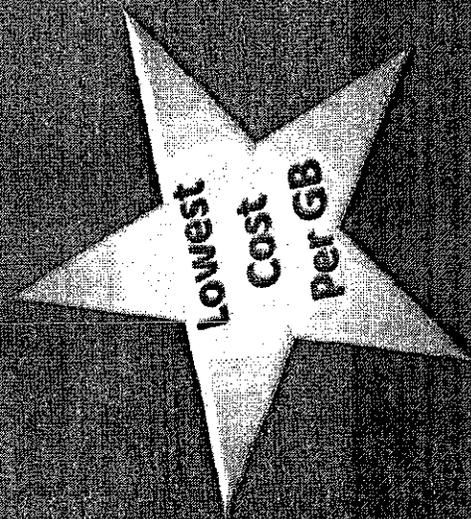
**DIRECT TESTIMONY OF
GENE DEJORDY
ON BEHALF OF
NATIVE AMERICAN TELECOM, LLC**

February 7, 2014

EXHIBIT D

TAZCA—CONNECTS

Fast. Easy. Managed 4G LTE Broadband



**Fast, Easy, Managed
4G LTE Broadband**

Low CAPEX & OPEX

**Packaged technology,
managed services and
spectrum options**

LTE Packages = (Hardware) +
(Software) + (Managed Services)
+ (Spectrum)

**Fastest Path to
Subscriber Enrollment**

200 to 2,000 Active
Subscribers Per Site

**Up to 22x Faster
Downloads**

Shared Speeds up to 450MBps

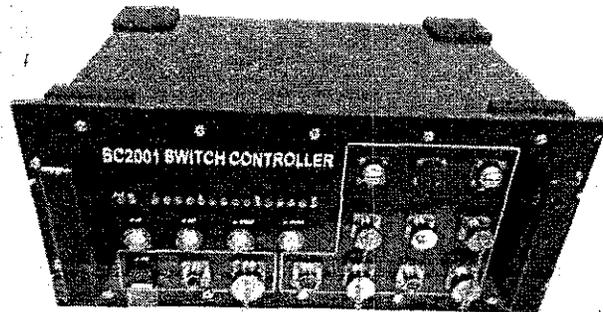
Wednesday, November 6, 2013

WISPAPALOOZA

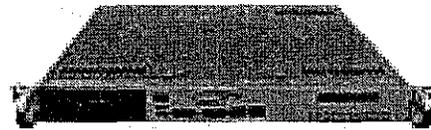
Tazca Picked Best LTE Solution

LTE Value to WISPs

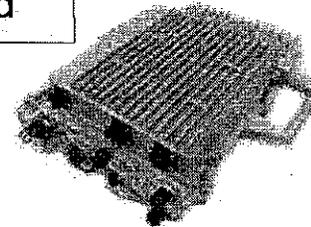
1. Rock solid commercial grade quality
2. Highest number of subscribers per radio (2,000)
3. 95% of LTE Backhaul Eliminated
4. Lowest LTE cost per GB per Mhz POP
5. LTE EPC is 100% Virtualized & 100% Distributed



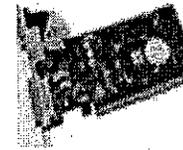
2005



2007



2012



2013



Next

LTE Standard:

- LTE is the Long Term Evolution of the 3GPP radio network
- LTE is synonym for the evolved UMTS Terrestrial Radio Access Network (E-UTRAN) since it defines the new LTE radio interface

TAZCA—CONNECTS

Pricing

Pricing: Collaborative & Based on PASS

PASS

- Packaged, Affordable, Speed & Subscribers
- Lowest cost per GB & “No CAPEX”
- ✓ Step 1 Jointly evaluate your WISP Business Model
- ✓ Step 2 Jointly analyze Spectrum options
- ✓ Step 3 Jointly finalize Business Model & Add services
 - Site
 - Sector
 - Subscriber
 - Spectrum
 - Services (e.g. remote monitoring, billing, VoIP, VoLTE, roaming)

Business Reasons to Deploy LTE

1. Demand is growing for faster connectivity & bandwidth in both rural & urban
2. LTE provides higher data rates & lower latency
3. LTE is best path for faster subscriber enrollment
4. Alternative models like WiMAX cannot overcome LTE (802.16M Chipsets running out)
5. WISPs can deploy LTE without prior 2G/3G infrastructures
6. TD & FD LTE licenses easier to obtain

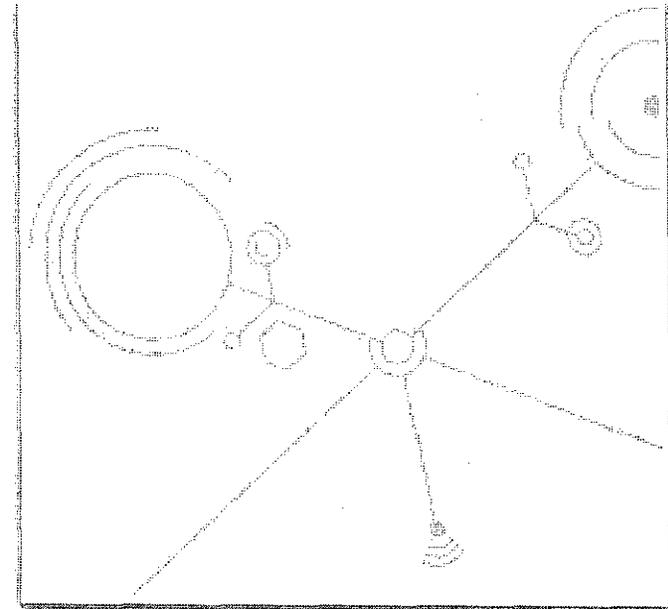
Technical Reasons to Deploy LTE

Tazca LTE has simplified the Radio Network Designs

- All IP and single EPC core network design
- 100% virtualized & distributed EPC on network edge at the Tower
- Enables Multiple Input Multiple Output (MIMO) antennas for optimal performance
- Uses Frequency Division Duplex (FDD) or Time Division Duplex (TDD) modes.
 - FDD Mode uplink & downlink happens in separate frequency bands
 - TDD Mode uses timeslots of the same frequency band for downlink & uplink
- LTE Downlink uses Orthogonal Frequency Division Multiple Access (OFDMA)
- LTE Uplink uses SD-TDMA which optimizes the radio interface for the mobile environment

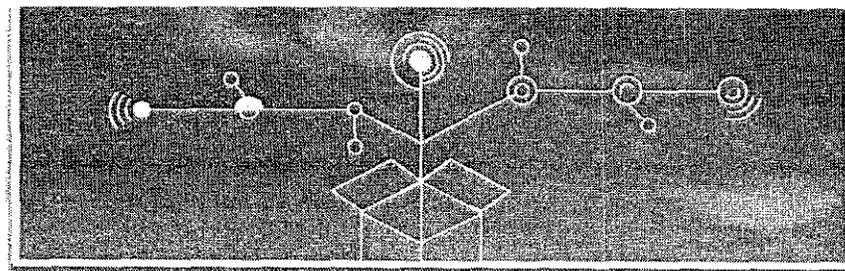
LTE Deployment & Ranges

1. LTE Macro Radio has a range of up to 40KM with capacity up to 2,000 active subscribers
2. LTE peak download rates up to 150 MBps
 - Use the UE category 4 with 2x2 MIMO in the full 20 MHz bandwidth
3. LTE peak uplink rates of 75 MBps
 - Use the 20MHz band



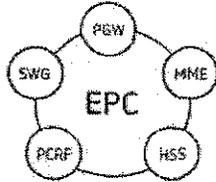
Capacity of LTE

1. LTE capacity is based on resource blocks (RB)
2. Number of resource blocks depends on bandwidth
3. The amount of LTE resource blocks per bandwidth
 - LTE Bandwidth (MHz) 1.4 = 6 Resource Blocks
 - LTE Bandwidth (MHz) 3.6 = 15 Resource Blocks
 - LTE Bandwidth (MHz) 5.0 = 25 Resource Blocks
 - LTE Bandwidth (MHz) 10 = 50 Resource Blocks
 - LTE Bandwidth (MHz) 15 = 75 Resource Blocks
 - LTE Bandwidth (MHz) 20 = 100 Resource Blocks

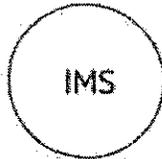


Tazca LTE Architecture

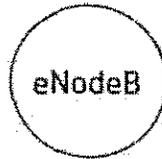
Managed LTE



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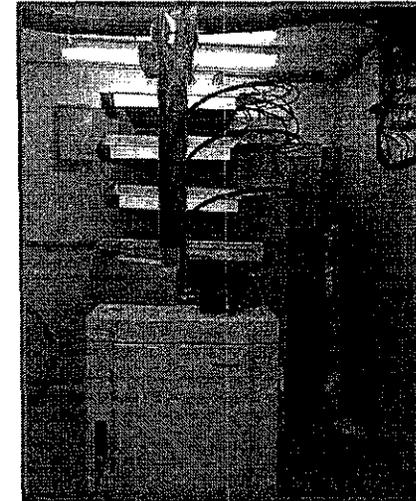
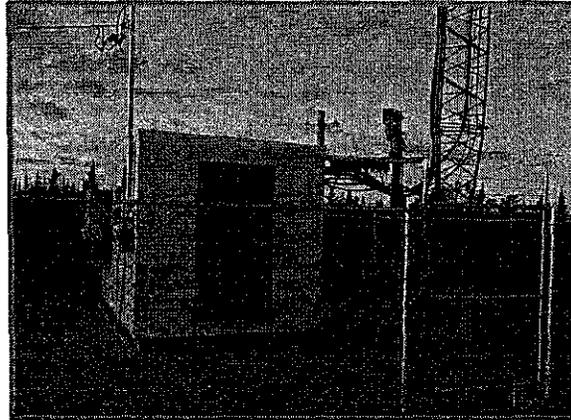
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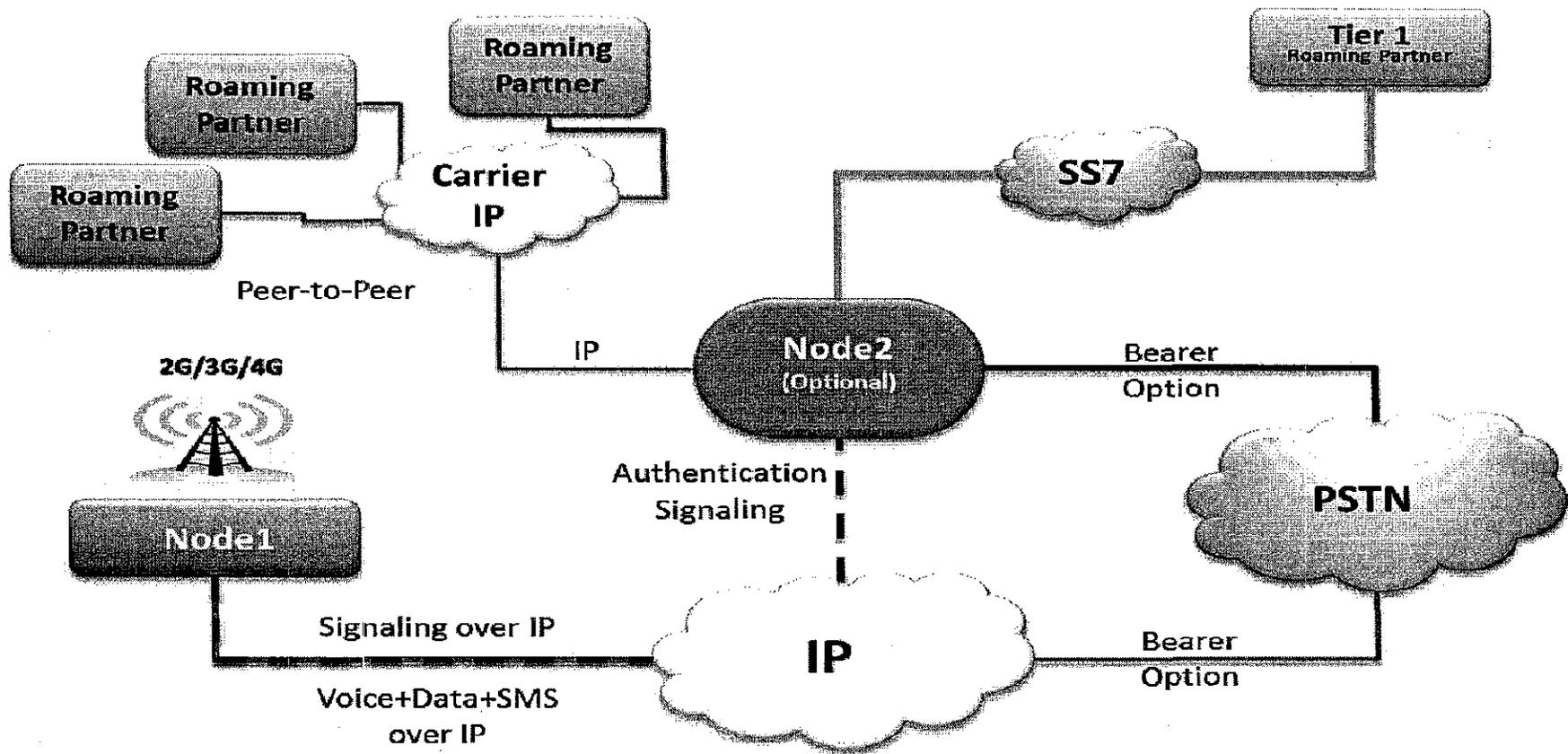
Macro or Mini



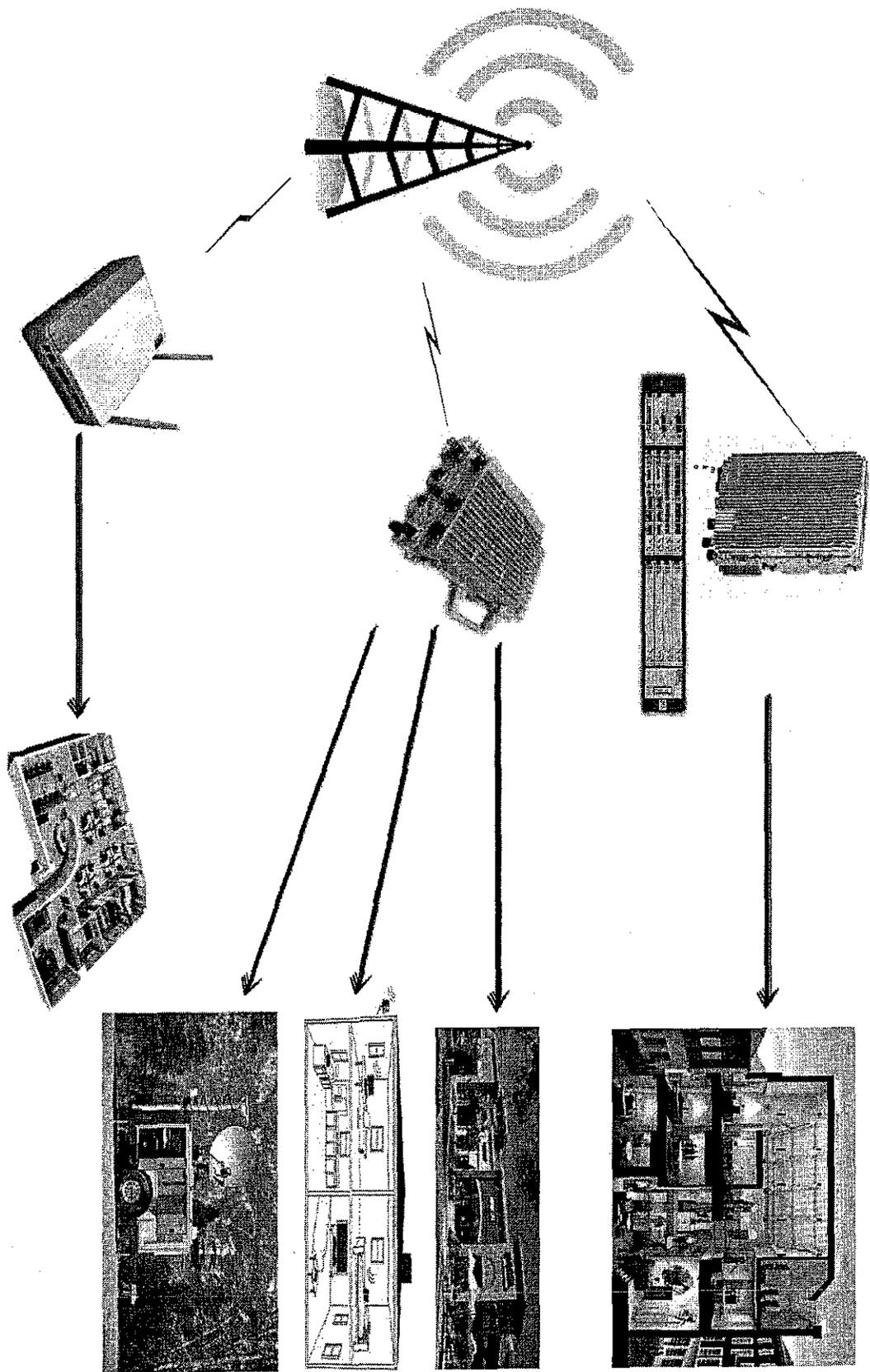
LTE Value to WISPs:

1. Rock solid commercial grade quality
2. Highest number of subscribers per radio (2,000)
3. 95% of LTE Backhaul Eliminated
4. Lowest LTE cost per GB per MHz POP
5. LTE EPC is 100% Virtualized & 100% Distributed

Tazca LTE Enables Roaming



Deployment Options



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Deployment Options Benchmarks

Categories	Average WISP Operations	Option 1 Broadband with LTE Node 1 Macro	Option 1 Benefits	Option 2 Broadband with LTE EM-50 Mini	Option 2 Benefits	Option 3 Broadband with LTE AP Pico	Option 3 Benefits
Modes	Unlicensed or Licensed WiMax	Licensed 2G/3G/4G/LTE		Licensed LTE		Licensed LTE & Unlicensed Wi-Fi	
Spectrum Bandwidth	Up to 10MHz	1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz		1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz		20MHz	
Bandwidth (Peak Data Rate Down Link)	20Mbit/s	150Mbit/s to 450Mbit/s	22x (Better)	150Mbit/s	7.5x (Better)	150Mbit/s	7.5x (Better)
Bandwidth (Peak Data Rate Up Link)	3Mbit/s	50Mbit/s		50Mbit/s		50Mbit/s	
Power (Output)	2 x 1W or 2 x 2W	3 Sector @ 40W up to 4 X 4 MIMO		10W 2 X2 MIMO		2 x 125mW	
Virtualized EPC & IMS	No*	Yes		Yes		Yes	
Coverage		Up to 30KM		Up to 10KM		Up to 100 Meters	
Capacity (Users Per Site)	50	2000	40x (Better)	200	4x (Better)	192	3.8x (Better)

*Not Available today, traditional hub/spoke EPCs preventing WISPs from entering LTE broadband space

Key LTE Broadband Benefits

Broadband Benefits to the WISP

1. Sell Higher Speed Business Class Broadband and Wi-Fi Offloading (contention based to contention less)
2. Sell On-Demand Wireless Event Management Requiring Mobility (COWs, Conventions, Meetings)
3. Gracefully expand your IP Network expertise to include LTE cellular spectrum—deploying mobility as any IT app.
4. Create new services and revenue streams by selling & packaging “small cell as a service” offerings in 2014
5. Get inside the enterprise with higher speed broadband and ability to launch new LTE broadband services



Broadband Benefits to the Tier 1 Carrier

1. Financially leverage capacity and coverage build outs inside the enterprise.
2. Virtually eliminate backhaul costs.
3. Create opportunities to recapture the enterprise (BYON counter)
4. Off-load data signaling from Carrier's core network (backhaul)
5. On-load data to the Carrier Assets (e.g. Spectrum from AT&T /Sprint/Verizon/T-Mobile)



Broadband Benefits to Enterprise CIO

1. Securely manage mobility and mobile workforces (cellular network access via enterprise LAN firewalls)
2. Improve mobile broadband coverage and performance
3. Reduce mobile broadband costs while expanding wireless infrastructure for critical network diversity (e.g. DR)
4. Resolve BYOD issues (e.g. no need for DAS solutions), fixing in-building coverage & capacity
5. Eliminate the complexity of purchasing, integrating and operating mobility in the enterprise

Next Steps

Current Timeline and Next Steps

1. **Confirm Spectrum, Budget and Phase 1 Deployment Objectives**
2. **Validate business plan outlining financial objectives**
3. **Finalize Phase 1 System Design**
4. **Execute Phase 1 Purchase Order**

Summary of Tazca Business Value

1. **Fast, Easy, Managed 4G LTE Broadband**
 - Tazca Provides the Fastest Path to Subscriber Enrollment**
2. **Reach Up To 2,000 Active Subscribers Per Site**
 - Up from Yesterday's Benchmark of 50 Active Subscribers Per Site**
3. **Pay As You Grow**
 - By Site, Sector or Subscriber**
4. **Up to 22x Faster Downloads**
 - With Speeds Up To 450MB**



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