Broadband Wireless Access - Enabling Broadband Qatar

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Contents

• Broadband Service Option
• Wireless Concept
• Requirements
• Technology & Why BWA
• Architecture
• Features
• Implementation

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**Wireless Concept**

- Subscribers farther from the base station use lower modulation efficiency (adaptive modulation)
- Capacity depends on distribution of subscribers sharing the channel
- Range decreases as operating frequency increases
- Range greatly reduced in non-line-of-sight vs. line-of-sight
- Life gets much more complicated with mobile clients
## Rural & Urban Requirement

### Rural Needs
- BWA for affordable broadband access
- Little/no profit motive=
- Government involvement
- Digital Divide

### Urban Needs
- Wi-Fi, mesh
- Focus on mobility and amenity, not access
- WiMAX for backhaul
- Profit motive for private operators
- Government as catalyst
- Digital Divide

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## Customer’s Requirement

- Starved for Cheap Access
  - Costs are rising
    - 30-50% of WAN costs
    - Increases 5-10% / year
  - No access providers to choose from
    - More dependence on a single access provider (ILEC)
    - Less redundancy
- Next-generation access options are widely UNavailable
  - Metro dark fiber is nowhere
  - Ethernet WAN (VPLS) in early stage, and 2+ years to widespread availability

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“Wireless technologies will eventually dominate the last mile of the telecommunications network” - Aberdeen Group

Why to Deploy BWA

- Where copper is prevalent “Wired ADSL” deployment will undoubtedly be the key technology access for broadband internet deployment, other technologies have complementary roles.
- The eventual mix of technologies used to deploy the access network for internet is unknown, but will dominated by Copper based ADSL.
- Wireless ADSL is the key complementary technology.
- Telco’s without access to copper networks must invest in Wireless systems.
  - Or face losing market share to carriers who rollout “Wired” ADSL services
- Telco’s with access to copper network must invest is Wireless Access systems.
  - To ensure that they can reach the 40-50% of users whose copper pairs are not suitable for “Wired ADSL”.

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Qtel vision of User-Centric Broadband Architecture

Service Offerings are Changing

From Internet Access to Multi Service

- broadband voice, video on demand, broadcast video
- home networking, music, gaming, security, usability
- product tiering, marketing push
- service launch, Internet access

Average bandwidth increases

connections

time

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New Generation Point to Multi-point Radio (NGPMR)

Called Broadband Wireless in Access (BWA) or Fixed Wireless Access (FWA)

NGPMR is a system that connects subscribers to the Public Switched Telephone Network (PSTN) and ISP using radio signals as a substitute for copper for all or part of the connection between the subscriber and the Switch/Router.

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NGPMR – Answering of Customers’ priorities

- Lower cost of ownership
- More new Services

•CAPEX/OPEX control
•Legacy networks end-of-life
•IP centric optimization

•New Revenues
•Better customer attraction
•Flexible service introduction

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**NGPMR Background**

<table>
<thead>
<tr>
<th>Prior to 2004</th>
<th>Why NGPMR</th>
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<tbody>
<tr>
<td><strong>Concept:</strong></td>
<td>• Voice (Service):</td>
</tr>
<tr>
<td>– Convergence and future-proof</td>
<td>– Toll Quality POTS</td>
</tr>
<tr>
<td>– Customer loyalty</td>
<td>– Transparency to Supplementary Services</td>
</tr>
<tr>
<td><strong>Key Factors:</strong></td>
<td>– Supports G3 and Super G3 Fax</td>
</tr>
<tr>
<td>– No Broadband &amp; POTS features</td>
<td>– Supports CLI</td>
</tr>
<tr>
<td>– Replacement of Outdated equipment</td>
<td>– Operates when power is down</td>
</tr>
<tr>
<td>– Vacation of frequency for 3G</td>
<td><strong>Timeline:</strong></td>
</tr>
<tr>
<td>– No NMS</td>
<td>• Started in April 04</td>
</tr>
<tr>
<td><strong>Timeline:</strong></td>
<td>• MC approved in May 2004</td>
</tr>
<tr>
<td>– Started in April 04</td>
<td>• Tender Evaluation submitted August 04 in favour of Airspan</td>
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<td><strong>Scope of Work (15 BS &amp; 1500 CPE):</strong></td>
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<tr>
<td>– Approved in January 05 for Airspan</td>
<td>– Survey</td>
</tr>
<tr>
<td><strong>Scope of Work (15 BS &amp; 1500 CPE):</strong></td>
<td>– Installation</td>
</tr>
<tr>
<td>– Survey</td>
<td>– Commissioning</td>
</tr>
<tr>
<td>– Installation</td>
<td>– Maintenance</td>
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**The NGPMR (BWA) Platform**

Designed to deliver high quality voice and data services using the latest wireless radio technology

1. **Existing Network**
2. **Exchange Interface**
3. **Backhaul**
4. **Base Station**
5. **Customer Equipment**

- NGPMR delivers a complete solution

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**Base station**

- NGPMR Base station
  - Designed for use over licensed spectrum
  - Reliable "interference free" service
  - Underpins operators end user Service Level Agreements (SLAs)
  - Delivers toll quality Voice and Data service to subscribers
    - Voice up to 36.1 Erlangs toll quality service
    - Data up to 8.52Mbps (downlink) and 5.26Mbps (uplink)
  - Fully managed through Network Manager

**Customer Premises Equipment**

- Internal Unit with Voice & Data Interfaces
  - Voice: RJ11 POTS Connections (32k ADPCM or 64kPCM – provisioned via NMS)
  - Data: RJ45 10/100bT Ethernet Ports
  - Ports activated / deactivated via NMS if end user service mix changes
  - Low power
  - Unobtrusive wall or desk mount

- External Frequency dependent antenna unit
- Small, lightweight & discrete
- "Craftless" (low skill) installation process
NGPMR – RF Interface

- NGPMR Automatically and continually adapts, to maximum throughput
- Continuous rate adoption in both the uplink and downlink

NGPMR – Mixed Voice & Data

- NGPMR Dynamically adjusts the boundary between Voice & Data to maximise Voice Pool.

<table>
<thead>
<tr>
<th>Voice</th>
<th>up to 48x 32k ADPCM channels</th>
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<tr>
<td>IP Data</td>
<td>up to 8.5Mb/s</td>
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Dynamically Changing Voice/Data Boundary
Original Configuration:
• 15 radio shelves
• 15 Omni/sectors
• 15 sites
• 7/8” coaxial feeder cables
• No fade margin
• ITU-R P.530-8
• Radio link availability not considered

Final Configuration:
• 23 radio shelves
• 21 Omni/sectors
• 16 sites
• 7/8” coaxial feeder cables
• 12.6 dB fading margin
• ITU-R P.530-8
• Radio link availability of 99.9%
Let’s connect
Thanks

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