Architecture of a MOOC: Low Band-width Scenarios
3 Major Content Components

- Lessons
- Interactions
- Assessments
Lessons

- Video Lectures
  - Released Periodically (weekly)
  - Come in Batches
  - Large window of time – view at convenience
  - Bandwidth
    - High
Interactions

- Forums, Hangouts
  - Happening Continuously
  - Narrow Window of time (real time or near real time)
- Bandwidth
  - Text – Low
  - Video - High
Assessments

- Tests, Assignments, Quizzes
- Could be quite frequent
- Some Videos may have interwoven Questions
- Time window – Large (except for in-Video questions)
- Bandwidth is low
Videos

- Streamed from a server
- Resolutions: 240p, 360p,…1080p

How YouTube streams
https://www.youtube.com/watch?v=OqQk7kLuaK4
## Network Bandwidths & Video Requirements

<table>
<thead>
<tr>
<th>Technology</th>
<th>Bandwidth</th>
<th>Service</th>
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</thead>
<tbody>
<tr>
<td>2G GSM</td>
<td>10 Kbps</td>
<td>Voice Calls</td>
</tr>
<tr>
<td>2G CDMA</td>
<td>10 Kbps</td>
<td>Voice Calls</td>
</tr>
<tr>
<td>2.5G GPRS</td>
<td>50 Kbps</td>
<td>Internet/e-mail</td>
</tr>
<tr>
<td>2.5G EDGE</td>
<td>200 Kbps</td>
<td>Internet/e-mail</td>
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<tr>
<td>3G</td>
<td>384 Kbps</td>
<td>Video Streaming</td>
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<tr>
<td>3.5G HSPDA</td>
<td>5-30 Mbps</td>
<td>HD Streaming</td>
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<tr>
<td>4G LTE</td>
<td>100-200Mbps</td>
<td>Mobile TV</td>
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</table>

<table>
<thead>
<tr>
<th>Video Quality</th>
<th>Resolution</th>
<th>Min. Bit-rate</th>
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<tbody>
<tr>
<td>240p</td>
<td>426 X 240</td>
<td>300 kbps</td>
</tr>
<tr>
<td>360p</td>
<td>640 X 360</td>
<td>400 kbps</td>
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<tr>
<td>480p</td>
<td>854 X 480</td>
<td>500 kbps</td>
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<tr>
<td>720p</td>
<td>1280 X 720</td>
<td>1500 kbps</td>
</tr>
<tr>
<td>1080p</td>
<td>1920 X 1080</td>
<td>3000 kbps</td>
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Poor connectivity?

- A major issue in Developing countries
- SPOCs for Development
- Videos won’t stream
  - The ‘spinner’
- May be able to participate in Text Interactions
- Assessments may be possible
What can we do?

• Download Slides, Transcripts
• Audio only – not video
• Mail Videos on a DVD
• Use a local server
Directly to the Server
Through an Intermediary - Madhyam
Madhyam Use cases
References

Thank You