Cable Systems Mass Adoption Considerations

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Solomon Islands Cable Systems

The submarine fiber optic cables Ready for Service (RFS) milestones are imminent

The Solomon Islands geography and population distribution are key factors in further rollout

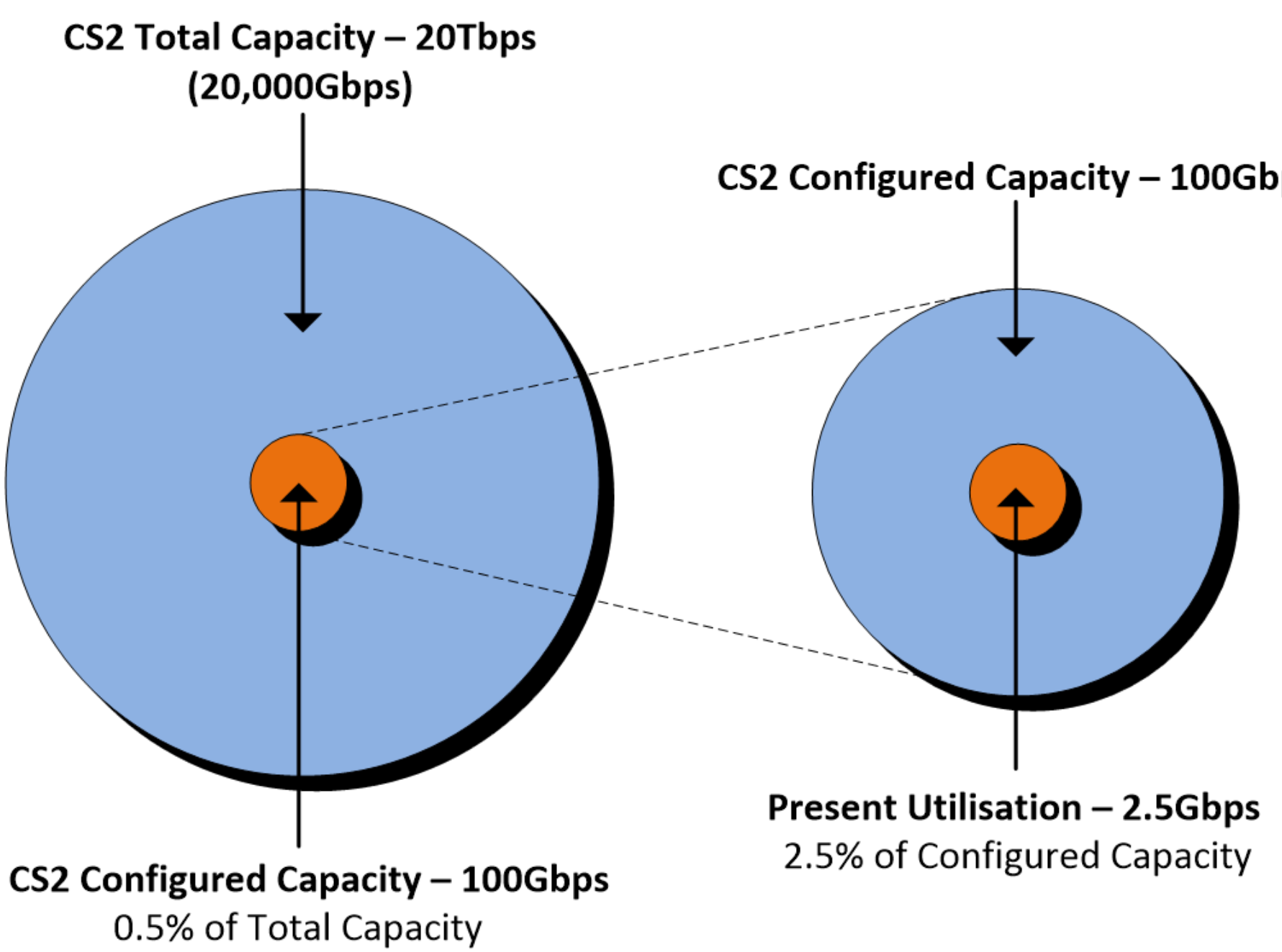
Coral Sea Cable System (CS2) will connect Honiara to Sydney with high capacity

Solomon Islands Domestic Network (SIDN) will connect Honiara to each of:

- Auki
- Noro
- Taro

Provincial areas are the key for mass adoption of high-speed Internet services

CS2 brings massive opportunities and at the same time introduces significant risks


CS2 Total Capacity – 20Tbps
(20,000Gbps)
CS2 Configured Capacity – 100Gbps
0.5% of Total Capacity
CS2 Configured Capacity – 100Gbps
Present Utilisation – 2.5Gbps
2.5% of Configured Capacity

Key Questions

How do we best utilize these new submarine fiber optic cables?

How can these cables benefit the people of the Solomon Islands?

How do we connect as many people as possible and at high-speed?

How do we foster business growth and digital innovation?

How do we deliver better Government services?

How do we prevent duplication of key telecommunications infrastructure?

How do we perform these things in a cost-effective and socially-responsible manner?

How can we mass adopt the cables?

The retail service providers are busily working to increase their network capabilities

The retail service providers have visions to offer next generation services:

- High speed mobile broadband (4G/5G)
- High speed fixed line broadband (FTTx)
- High speed fixed wireless (BWA)

Ensure these services are priced to foster mass adoption

Develop regional infrastructure outside of Honiara and in the provinces

Potential for regional assistance or subsidisation programs

Rationalise duplicated infrastructure and promote asset sharing

Further telecommunication policy framework development

What is Peering?

Peering is the “settlement-free” interconnection of telecommunication providers

Peering allows for Internet traffic in the Solomon Islands to stay local to the Solomon Islands

Avoids the time (network latency) and cost (Internet transit) of sending data offshore and back

Peering improves the customer experience and fosters digital transformation and e-commerce

Peering improves the Solomon Islands Internet resiliency

Peering lowers Internet transit costs which can then be passed through to the consumer

Peering can be established through two different approaches:

- Individual direct interconnection between two given retail service providers
- An Internet Exchange Point (IXP) where multiple retail service providers “meet”

Market Implications of Peering

A robust IXP solution that provides peering services is advantageous to the market

The IXP solution should be neutral and independent of each retail service provider

The IXP solution should be cost-recovery funded and settlement-free based

The IXP may require address space and routing in order to offer the full-suite of services

Peering can be extended further from the Solomon Islands to Internet exchanges in Sydney

Equinix in Sydney has access to many upstream services and cache repositories

Why is it important to have one or more neutral and independent IXP's:

- Otherwise the IXP owner can make market-impacting decisions such as billing for peering traffic
- Some content cache providers require that certain size markets share caching infrastructure
- Each party to the IXP can be a voting member of the governance entity

What is Content Caching?

What happens when an Internet consumer opens a given website (e.g. YouTube)?

Content Distribution Networks (CDN's) make up a large portion of all Internet traffic

Content caching provides this CDN traffic locally to consumers within the Solomon Islands

Results in a better experience (lower latency) and reduced Internet transit (less congestion)

Example:

- Google Global Cache (GGC)
- Between 70% - 90% of Google cacheable traffic can be served from the GGC
- YouTube is a fine example of cacheable GGC traffic
- GGC typically serves between 25% - 60% of ALL Internet traffic in a given market
- Highly market dependant and based upon consumer behaviours
- Equipment is supplied and managed by Google for free
- Requires local hosting, power, cooling, and a mechanism for cache-fill

Market Implications of Content Caching

Content caching reduces the load on expensive Internet transit and peering circuits

Resiliency of local content caches is an important factor for retail service providers to consider

There are clear benefits to hosting content caches at one or more local IXP's:

- Content caches can be shared amongst the retail service providers
- The hosting and cache-fill costs can also be shared between the retail service providers
- Resiliency can be added by launching a second IXP within the same region

Content caching is completely transparent to Internet consumers

Cache-fill can occur over upstream peering links to the master cache repositories

Mature telecommunication markets serve between 60% - 75% of content from caches

Upstream wholesale transport providers need to assess the business impact of caches

Peering and Caching Considerations

Policy, structural and governance requirements

Barriers for establishment and ongoing operation

Benefits and risks associated with various IXP models

Shared cost recovery and settlement-free implications

Technical aspects of the IXP services:

- Content cache hosting at the IXP
- Country TLD hosting at the IXP
- Root DNS server hosting at the IXP
- Cyber Security matters as they apply to the IXP
- NOC requirements as they apply to the IXP

Scenario 1: Cable Fault

What is a cable fault and what is its impact?

Examples of past cable faults (Tonga, Pohnpei, etc.)

How do we protect against this scenario?

What is the likelihood of a cable fault?

Who performs the cable protection function?

Scenario 2: Distributed Denial of Service

What is a Distributed Denial of Service (DDoS) attack and what is its impact?

Examples of past DDoS attacks (CloudFlare, AWS, etc.)

How do we protect against this scenario?

What is the likelihood of a DDoS attack?

Who performs the DDoS protection function?

Scenario 3: Cyber Attack

What cyber threats are out there in the wild and what is the impact?

Why does the Solomon Islands exposure increase with cable connectivity?

Who is responsible for knowledge and detection of cyber threats:

- Policy
- Governance
- SIG-Connect
- Retail service providers

Who is responsible for mitigating against cyber threats?

Fast paced and constantly evolving landscape

Is also a matter of national security

Physical Cable Resiliency

What do future additional cable systems mean for the Solomon Islands?

- International cables
- Domestic cables

Do additional cable systems increase the underlying cost of retail Internet products?

Is there a bandwidth critical-mass requirement for additional cable systems?

How do we gain resiliency through the deployment of additional cable systems?

How do we introduce additional cable systems and maintain true transmission redundancy?

Internet Resiliency

What components make up the delivery of Internet services to Solomon Islands consumers?

Why do we need Internet resiliency?

Who is responsible for Internet resiliency and at what levels?

Upstream routing decisions and autonomy at each retail service provider is an important factor

Ability for retail service providers to use multiple upstream carriers is essential

Must maintain provider commercial freedoms and the ability to react to market forces

Shared Infrastructure

Passive versus active infrastructure sharing considerations

Wide-reaching stakeholder consultation is required

Masts and mobile plants

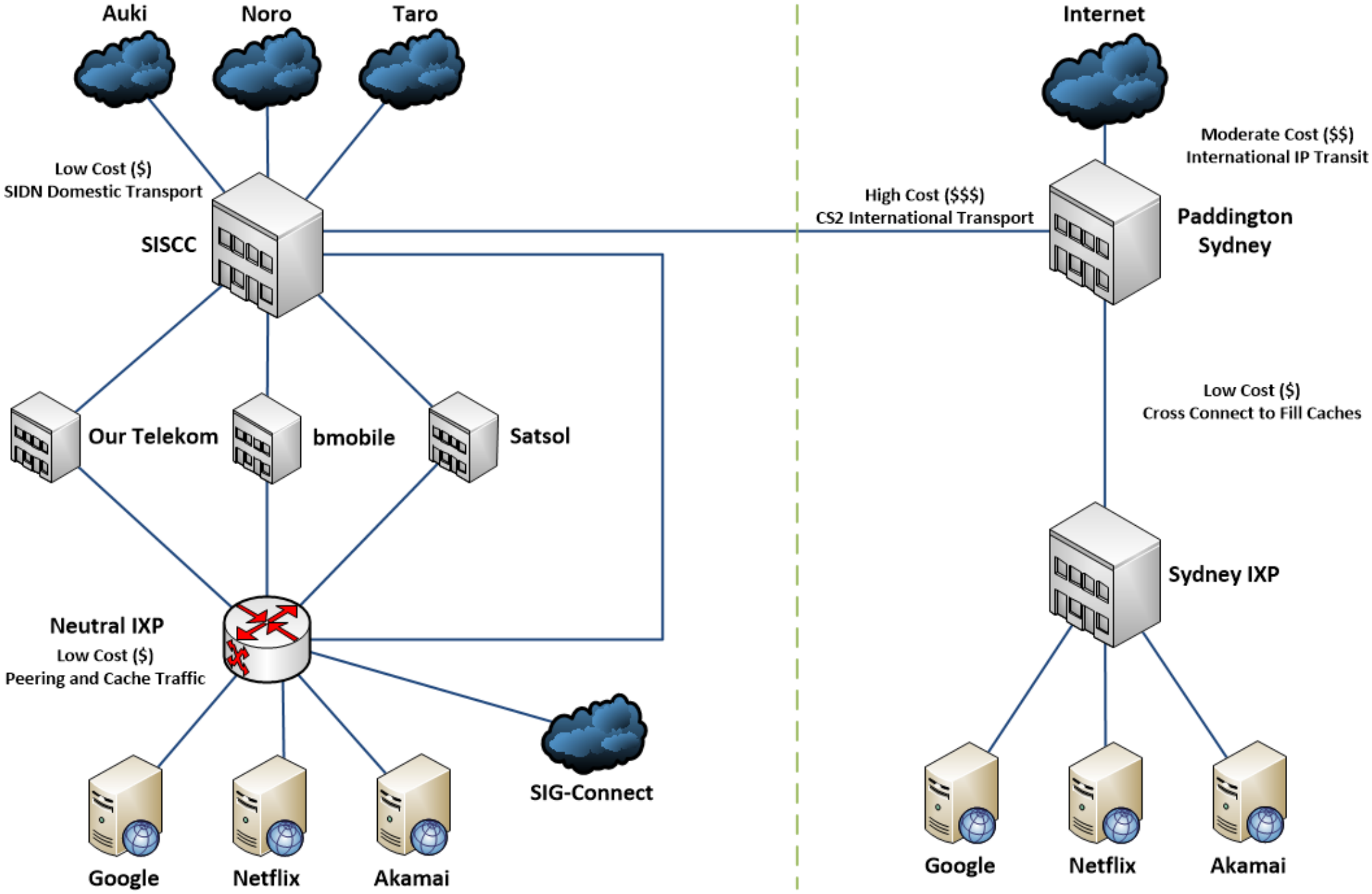
Fiber optic access networks

Fiber optic backbones

Rationalization of duplicated masts

Rollout of fiber optic access networks

Focus on provincial areas


Auki
Noro
Taro
Low Cost ($)
SIDN Domestic Transport
SISCC
Our Telekom
bmobile
Satsol
Neutral IXP
Low Cost ($)
Peering and Cache Traffic
SIG-Connect
Google
Netflix
Akamai
Internet
Moderate Cost ($$)
International IP Transit
High Cost ($$$)
CS2 International Transport
Paddington
Sydney
Low Cost ($)
Cross Connect to Fill Caches
Sydney IXP
Google
Netflix
Akamai

Questions and Comments

Thank you for your time!