The Health Intranet of Things

Presented To ATNAC 2013

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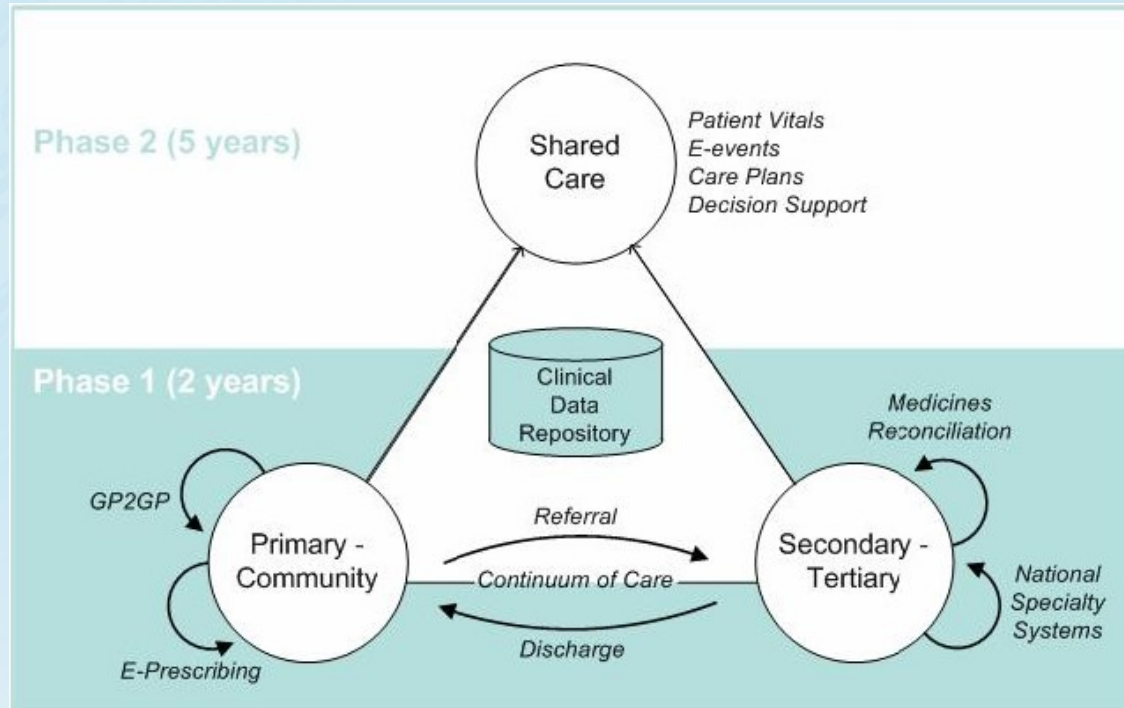
PREPARED BY

Triple Aim for Health

Derived from the Institute for Healthcare Improvement, the NZ Triple Aim has been embraced by the sector through the leadership by the Health Quality and Safety Commission

In order to deliver on these aims simultaneously, improvements in ICT implementation across the healthcare system are essential

- Data must be converted into useful information and

- Be available in the right form, at the right time, in any care setting

QUALITY IMPROVEMENT

Improved quality, safety & experience of care

Improved health & equity for all populations

INDIVIDUAL

POPULATION

SYSTEM

Best value for public health system resources

Enabling an Integrated Healthcare Model

To achieve high quality health care and improve patient safety, by 2014 New Zealanders will have a <u>core set of personal health information available electronically to them and their treatment providers</u> regardless of the setting as they access health services.

NZ Population

4,495,712 as on Sunday, 17 November 2013 at 09:45:54pm

Core Health Information - Health Identity, demographics, allergies and alerts, register of health information

Long Term Conditions - Shared Care Record

Comprehensive Clinical Assessment (InterRAI)

Maternity - Shared Record of Care

Well Child - Shared Record of Care

Mental Health - Shared Record of Care

Common Clinical Results (Laboratory results, Medications, Referrals, Discharges and other clinical documents)

Telehealth - In-home monitoring

Four Regional IT Platforms

Patient Portal

Clinical Information

Patient Administration and billing

Continuum of Care

Clinical Information

Imaging/Picture Archive

Clinical Systems Support

Patient Administration

National minimum dataset

Nat. immunisation register

Cancer register

B4 Schools dataset

Maternity, Pharms warehouses etc.

Connected Health

Home Settings

Primary/Integrated Family Health Centres

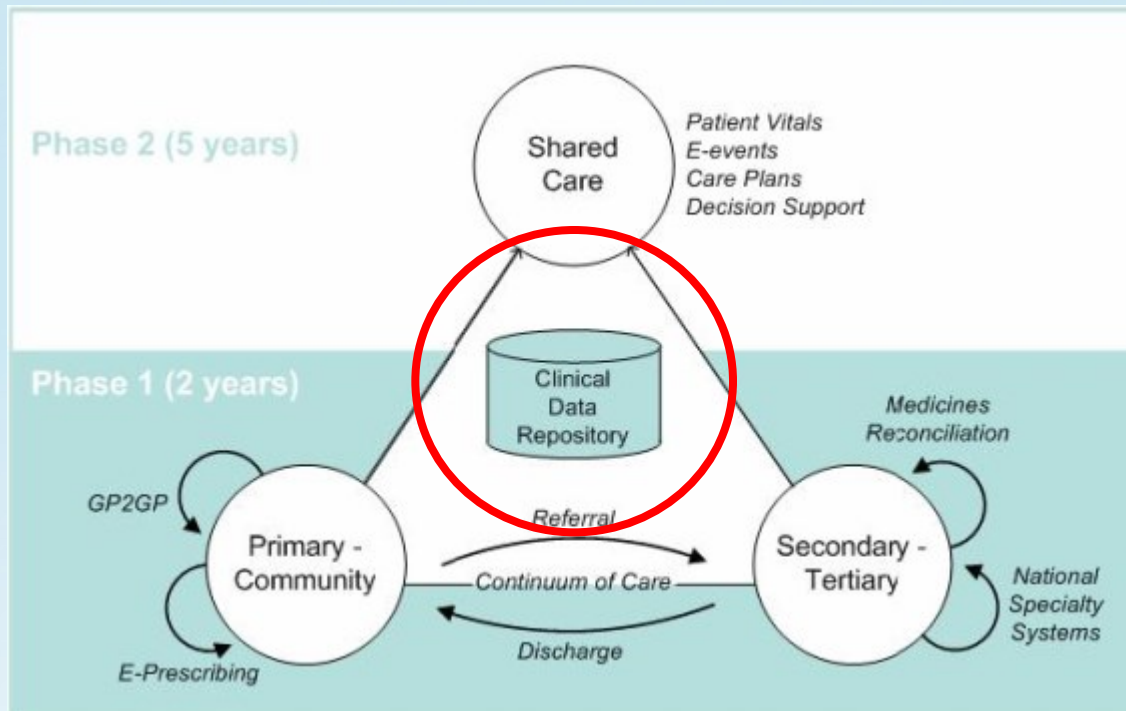**Specialist/Tertiary/ Secondary Hospital**

Public Health

Health Identity Underpins Safe Sharing of Information

❑ National Health Index uniquely identifies the patient

❑ Health Practitioner Index uniquely identifies every health practitioner

❑ Normal patient consent relates to a specific set of HPIs

❑ Authorization to access to any NHI record is based on HPI association with NHI

❑ "Break Glass" feature can enable any HPI to access any patient record

❑ Audit processes apply to every patient record access and especially under break glass" conditions
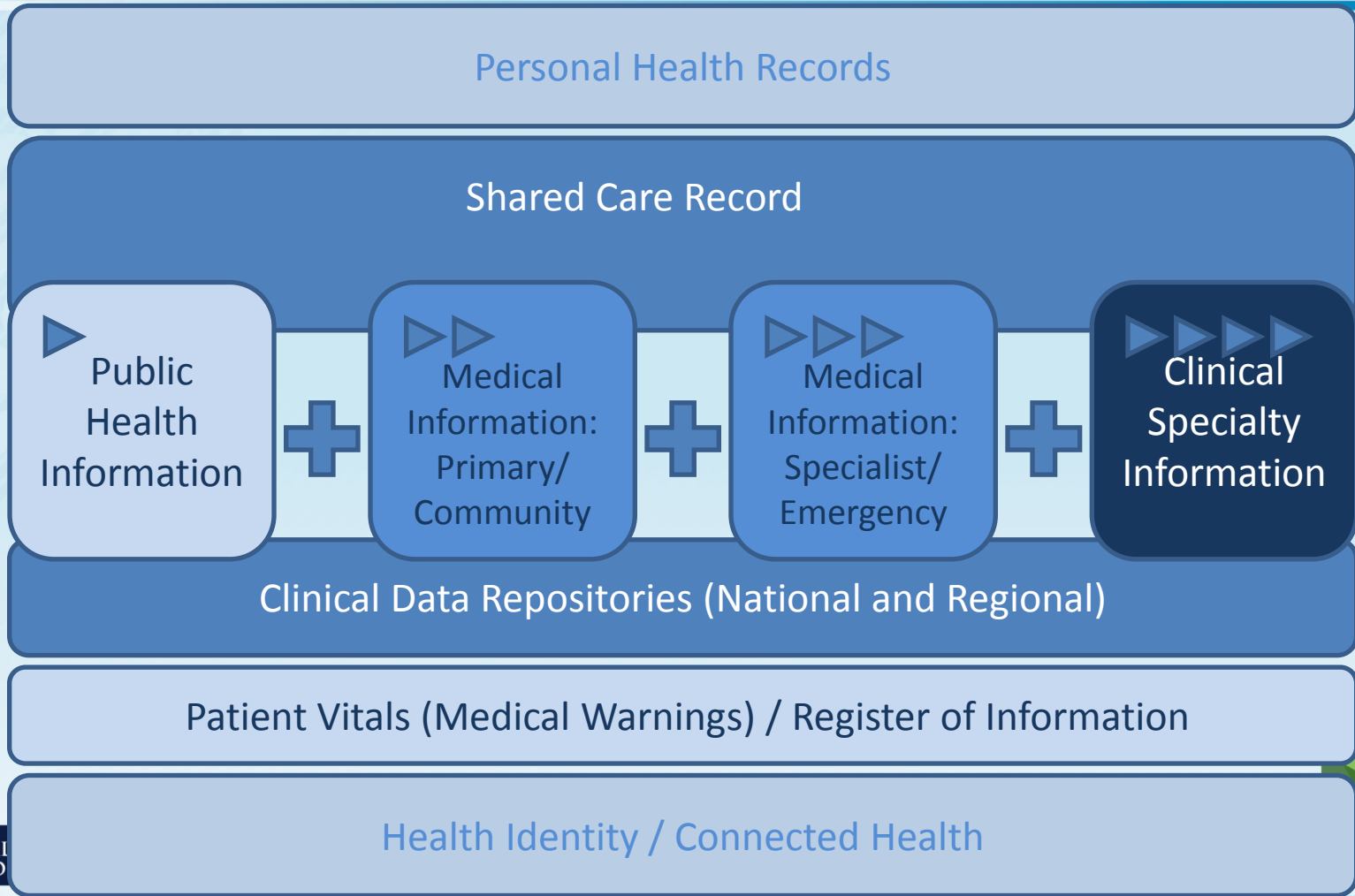

k6413529 www.fotosearch.com
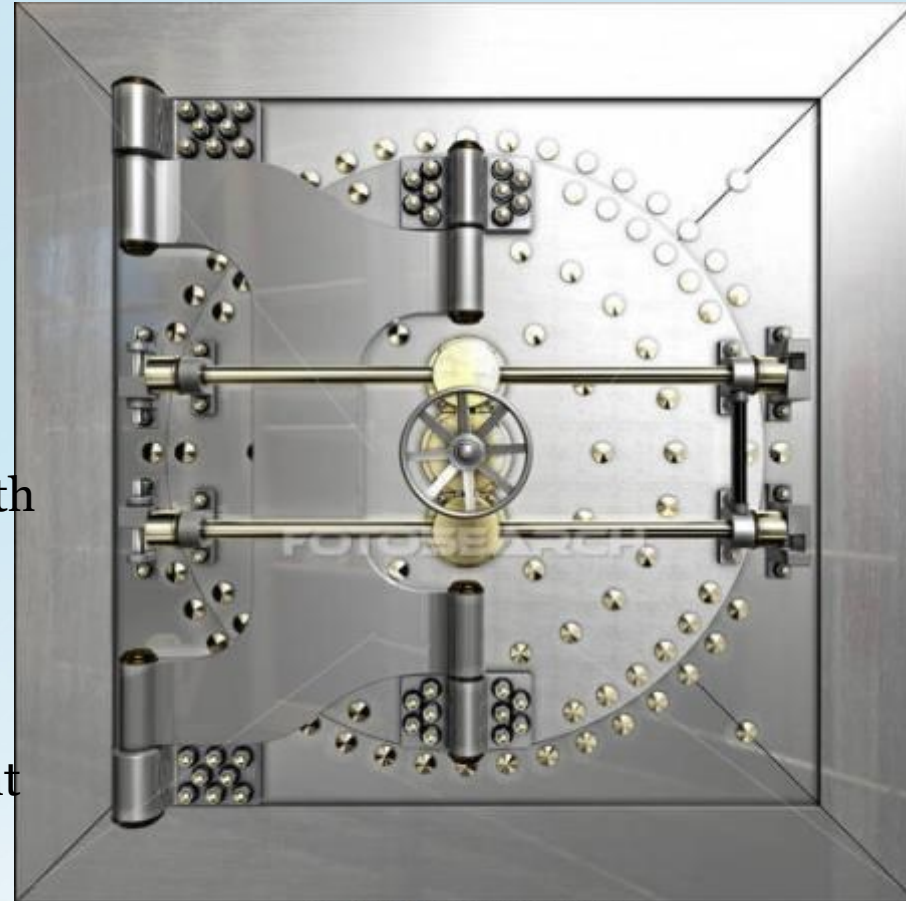
Health Private Cloud

❑ The Clinical Data Repository lies at the heart of the Health IT Plan

❑ This repository is not located within one physical Data Centre

❑ Rather it consists of data spread across a small number of geographically distributed Data Centres

❑ All the Data Centres and Health facilities are interconnected using Connected Health forming a **Private Cloud**

Phase 2 (5 years)

Shared Care

Patient Vitals
E-events
Care Plans
Decision Support

Clinical Data Repository

Phase 1 (2 years)

GP2GP

Primary - Community

Referral

Medicines Reconciliation

Secondary - Tertiary

National Specialty Systems

Continuum of Care

E-Prescribing

Discharge

IT HEALTH BOARD

Many Parts of the Health Private Cloud

Personal Health Records

Shared Care Record

Public Health Information

Medical Information: Primary/ Community

Medical Information: Specialist/ Emergency

Clinical Specialty Information

Clinical Data Repositories (National and Regional)

Patient Vitals (Medical Warnings) / Register of Information

Health Identity / Connected Health

DHBs: One Data Centre Per Region

❏ 40+ Data Centres reduces to four Physical Data Centres and one Logical Data Repository

❏ One Data Centre per region

❏ Each physical Data Centre supports around 1 million people

❏ Each Repository has a mirror in at least one other Data Centre for Disaster Recovery

❏ All Data is within 10 milliseconds of any user under normal operation
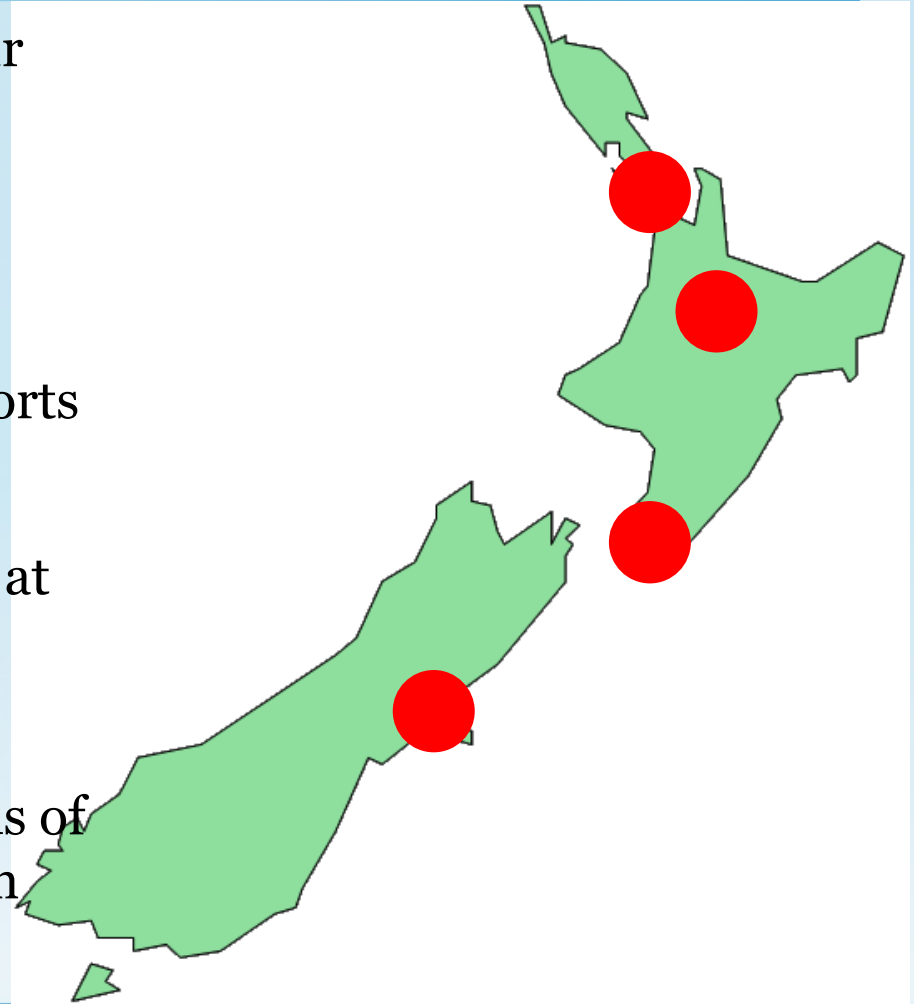
Different DHB Applications Distributed Across Four Physical Data Centres

🔴 Radiology Information Services

🟢 Clinical Workstation and Clinical Data Repository

🟡 Patient Administration System

🟣 ePharmacy

🔵 Finance Procurement and Supply Chain
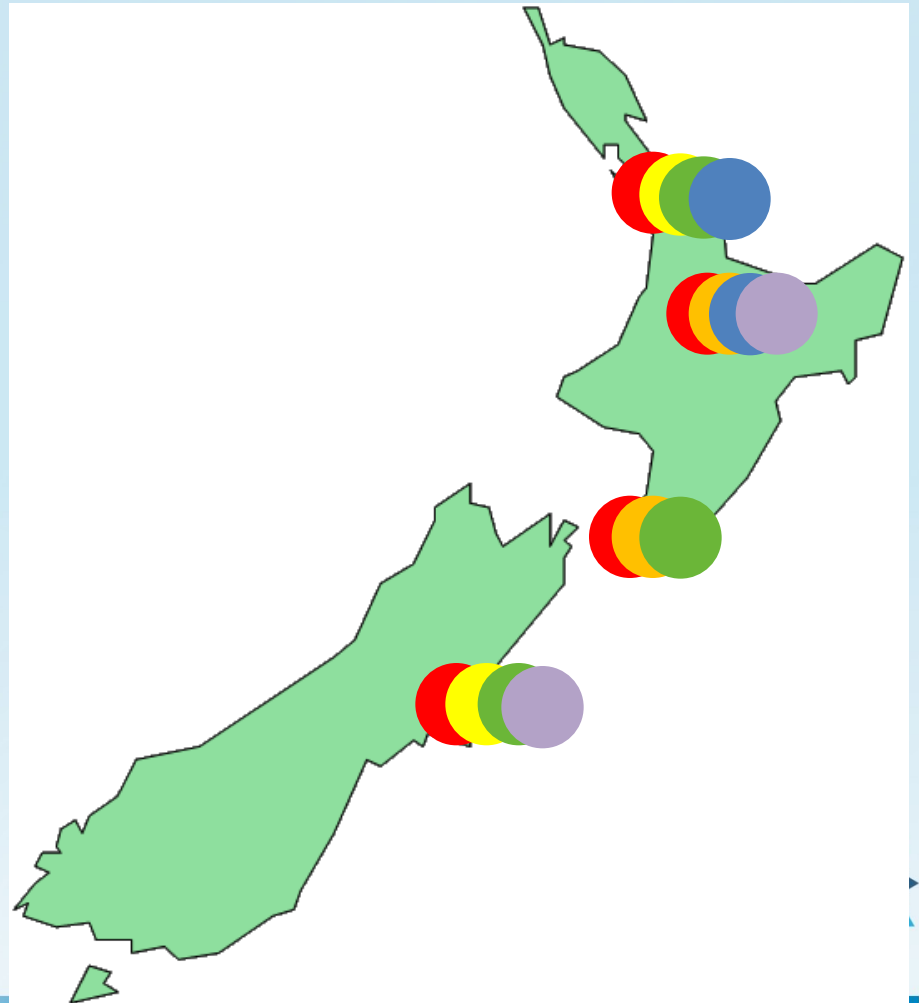
Integrated Care Models: Better Sooner More Convenient

**Model 1: Primary Care Common Information
(Rotorua General Practice Group)**

Common P/H Information

Research

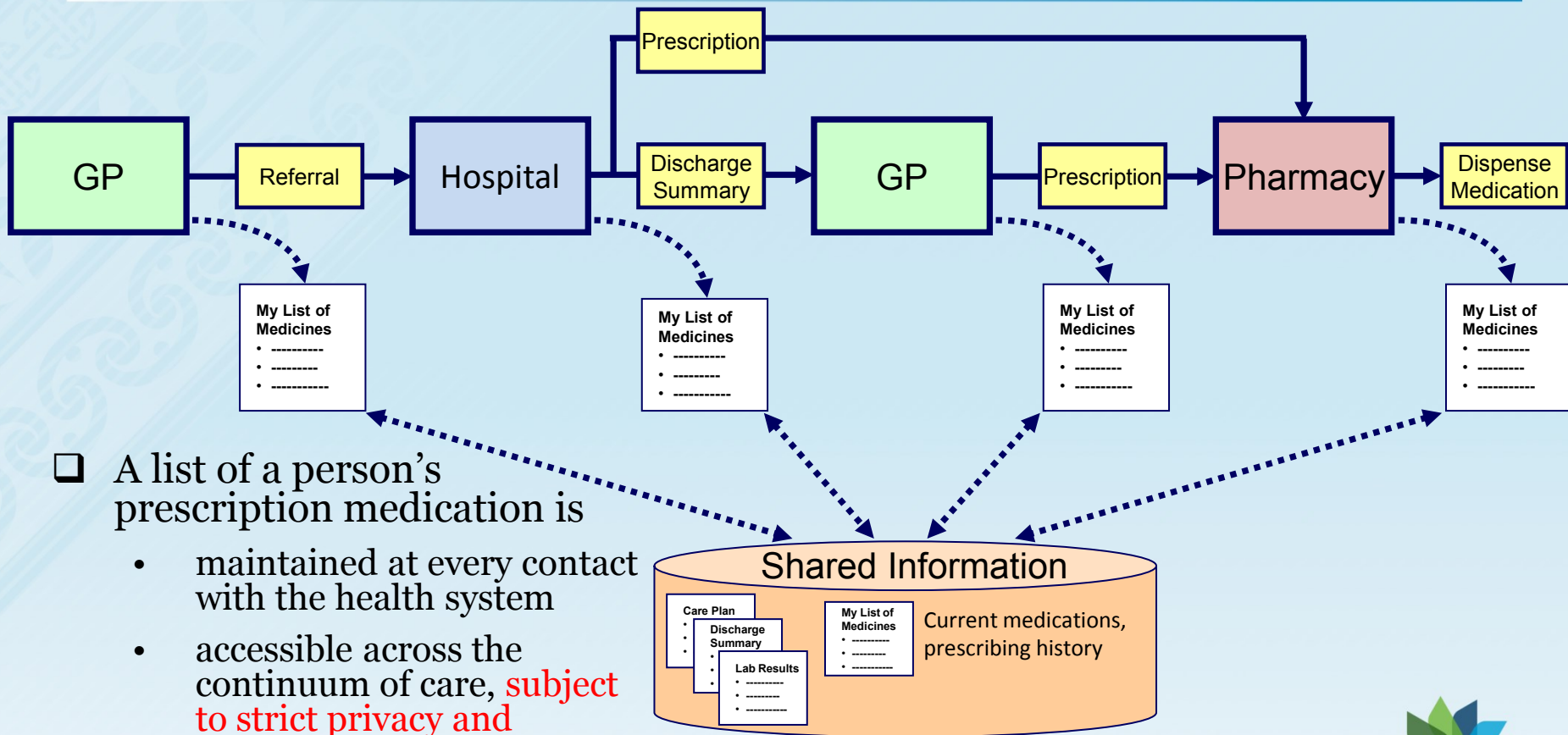Emergency/After Hours View

PMS

GP Practice
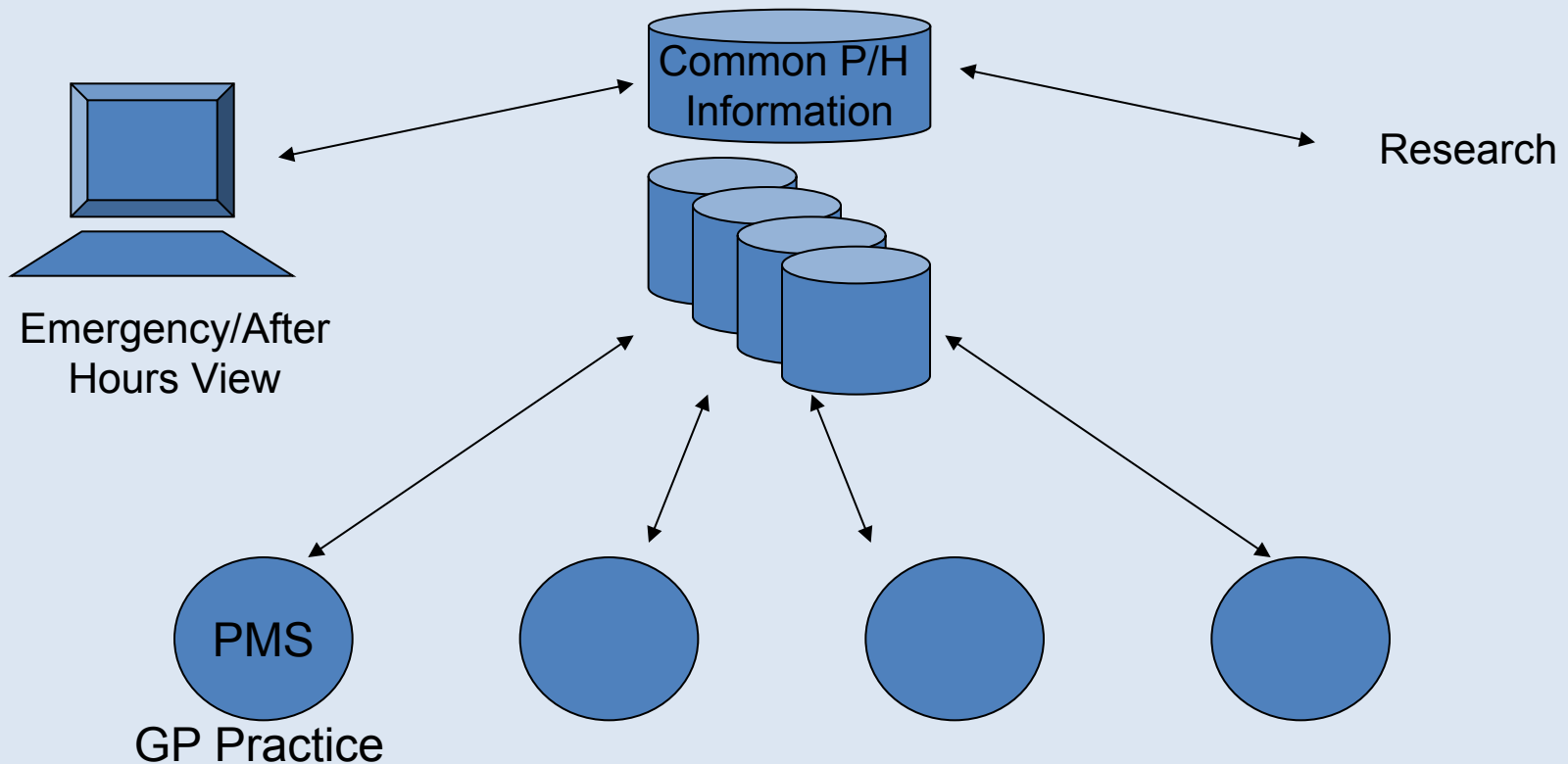
Integrated Care Models / Better Sooner More Convenient

Model 2: Primary Care Patient Portal – Medtech & Manage My Health (East Tamaki, Midland Health Network, Wairarapa)
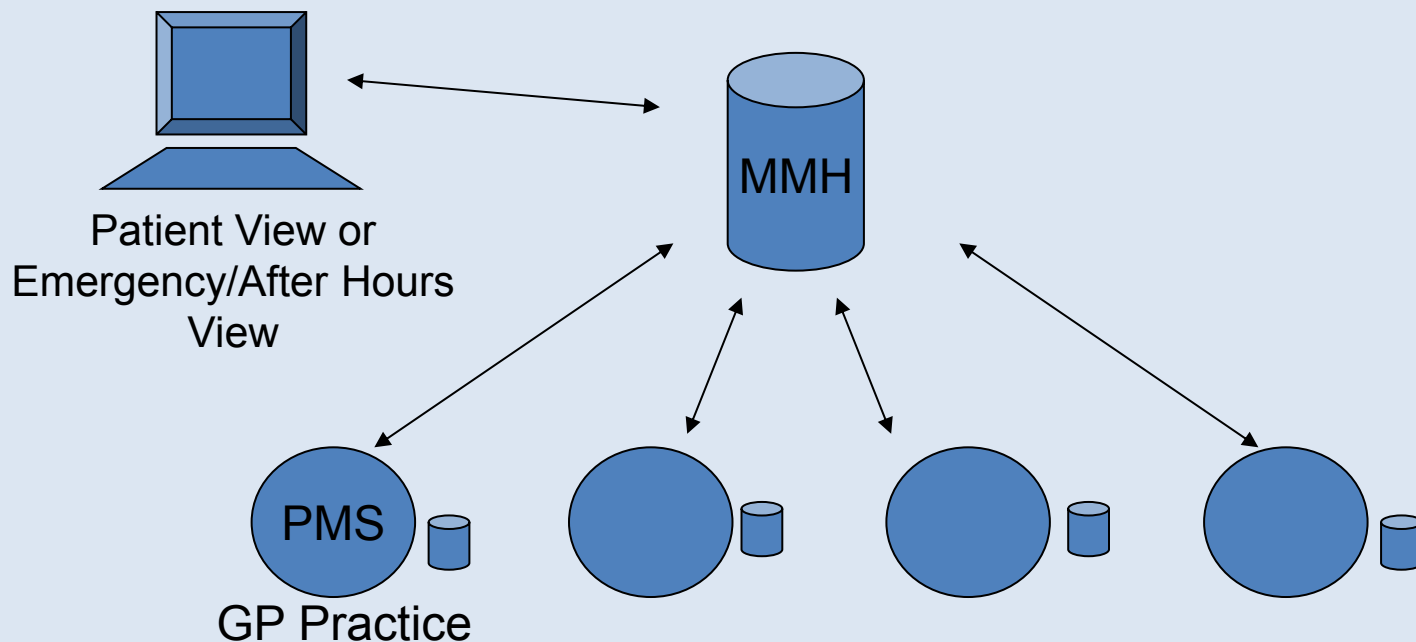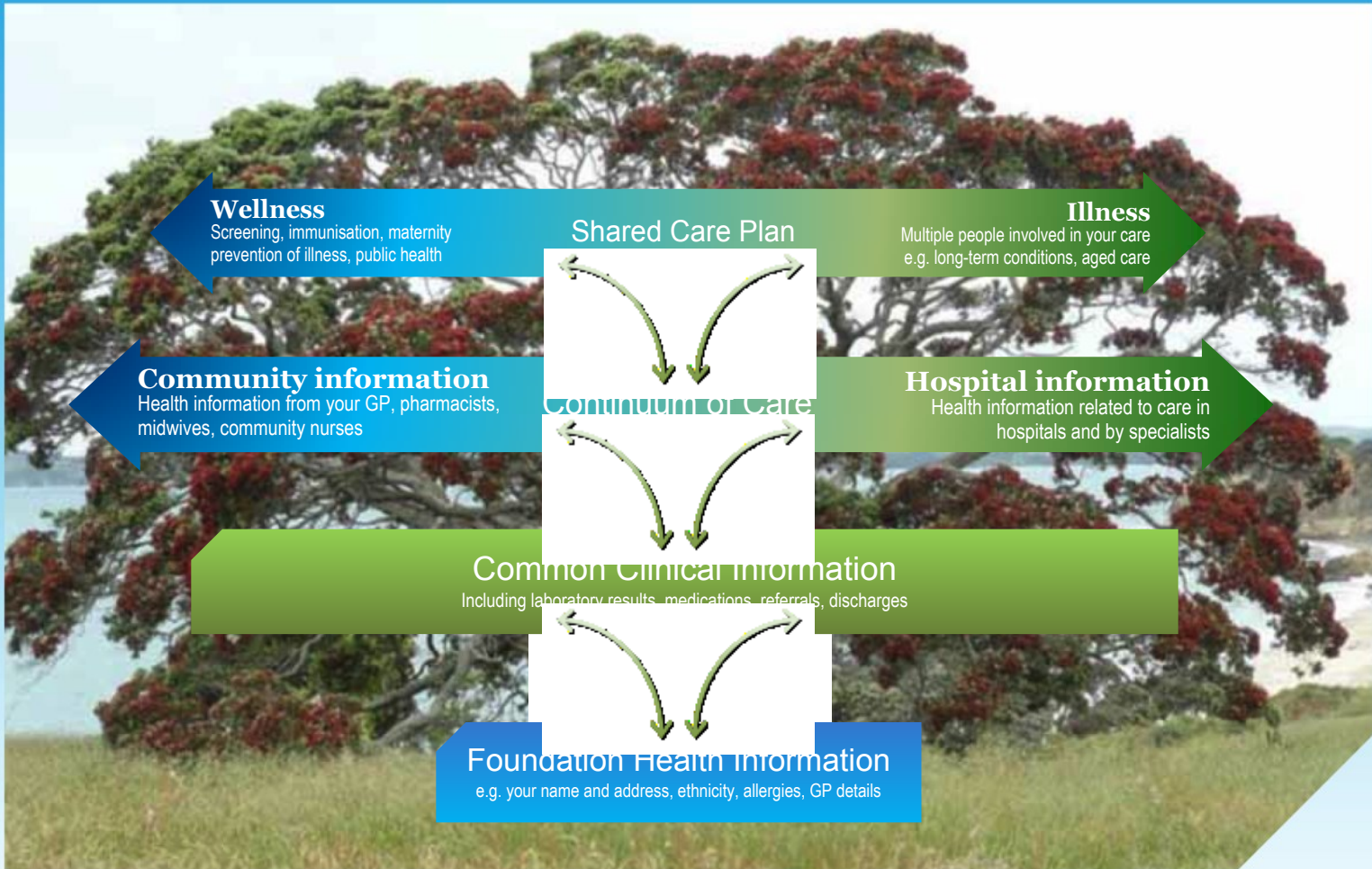
My List of Medicines

❑ A list of a person's prescription medication is

- maintained at every contact with the health system
- accessible across the continuum of care, subject to strict privacy and security controls

Wellness
Screening, immunisation, maternity prevention of illness, public health

Illness
Multiple people involved in your care e.g. long-term conditions, aged care

Shared Care Plan

Community information
Health information from your GP, pharmacists, midwives, community nurses

Hospital information
Health information related to care in hospitals and by specialists

Continuum of Care

Common Clinical Information
Including laboratory results, medications, referrals, discharges

Foundation Health Information
e.g. your name and address, ethnicity, allergies, GP details

Health Intranet of Things

- ❑ Many devices looking after many patients
- ❑ Many devices per patient
- ❑ Supplementing health practitioner care
- ❑ Enabling clinicians to collaborate better to deliver improved care
- ❑ Operating within any care setting for the patient
- ❑ **All connected to the Health Cloud using Connected Health**

Scope for NZ Telehealth Forum
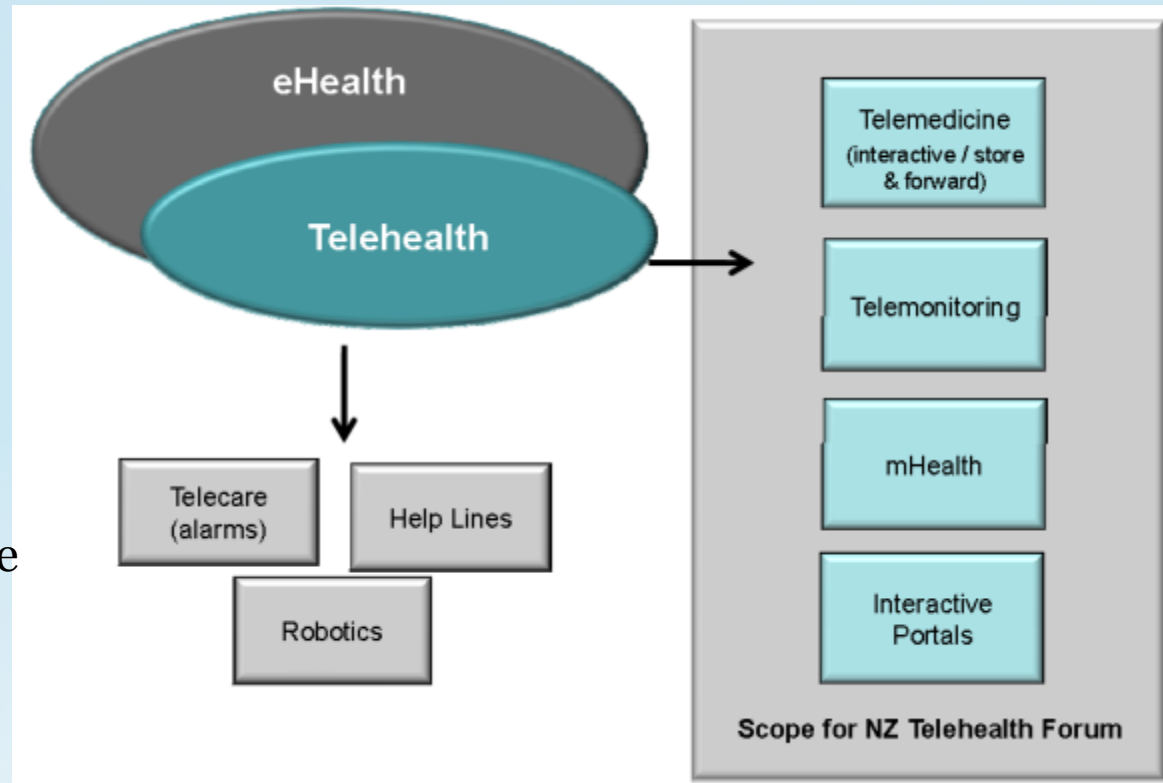
Within the Hospital

❑ All clinical instruments having wired or wireless connections to the Clinical Data Repository

❑ Recorded results readily visible to care team using Clinical Workstation

❑ Alerts for selected measurements

Within the Community

Collaborative working with hospital specialists and other health practitioners

Remote diagnostic and treatment capabilities
- From Skin Treatment to Dialysis

Within the Home

- ❑ Using TeleHealth capabilities to care for people in the home

  - Blood pressure monitoring,

  - Heart monitoring

  - Diabeties monitoring

  - Urine and feces monitoring

  - Activity monitoring

- ❑ Alarm based on exceptional indications/trends

- ❑ Requires an intelligent home with full remote monitoring with voice and video intervention
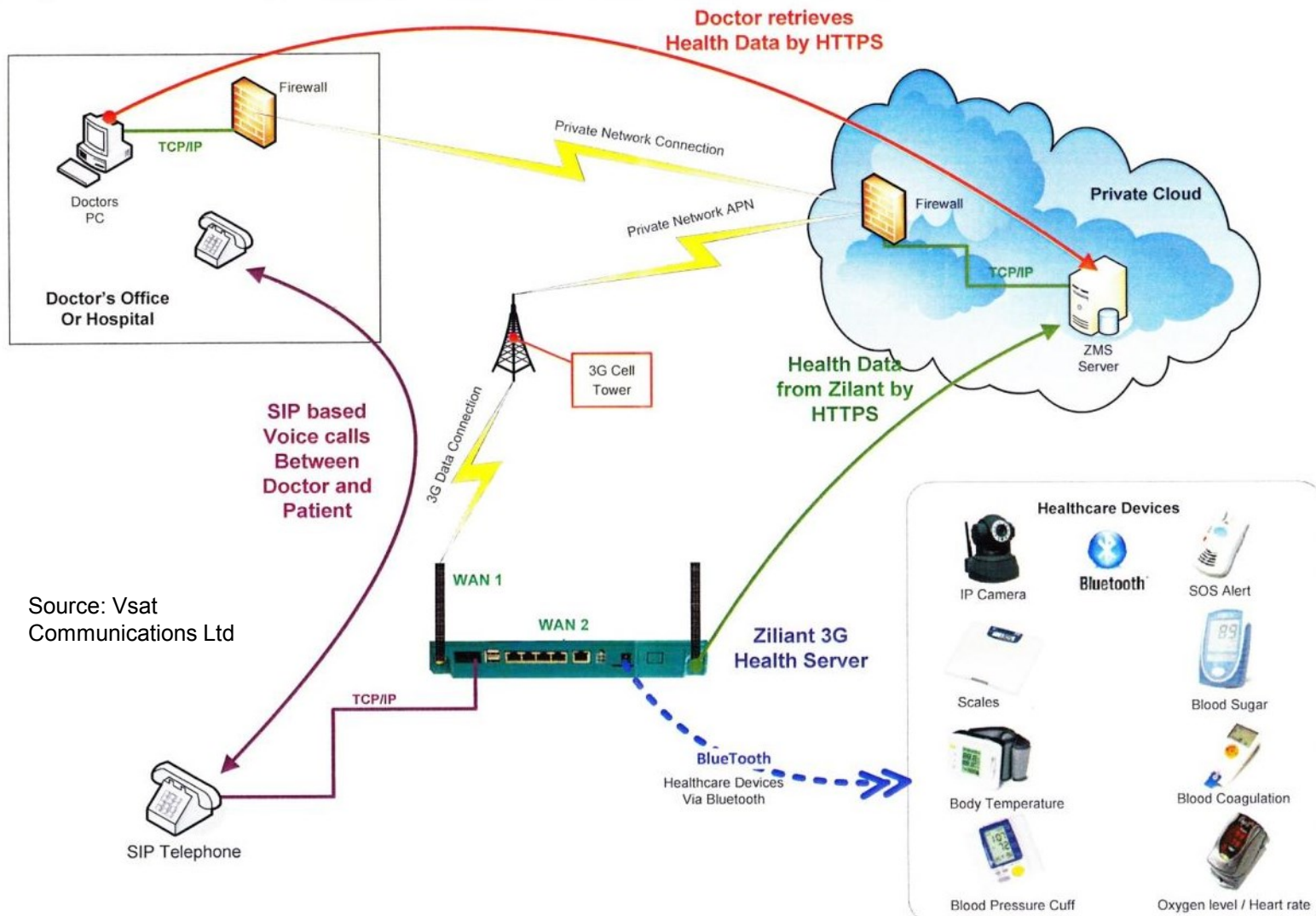
Source: One News

On The Move

Mobile Surgical Services

Mobile Ambulatory Services

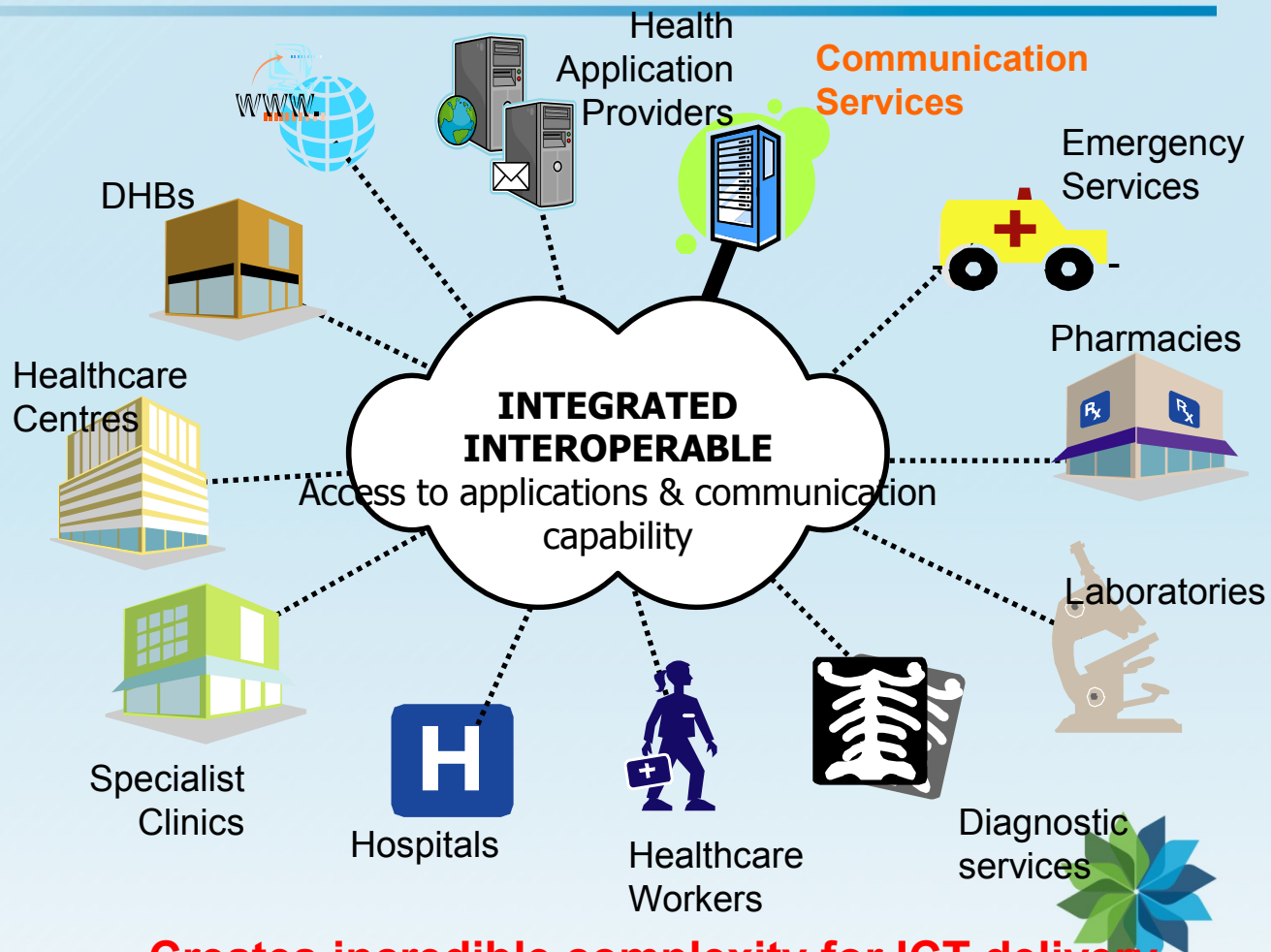# Example of Emerging TeleMonitoring Solution

Source: Vsat Communications Ltd

Health Intranet of Things Built on UFB and RBI

❑ Connectivity is the key to delivering the Health Intranet of Things

❑ The Government initiatives delivering the Ultrafast Broadband and Rural Broad are critical enablers for the Health Intranet of Things

❑ Both are required to deliver the full coverage and capability required to support the Health Intranet of Things for all New Zealanders

❑ Predictable and reliable performance are key parameters required to deliver the Health Intranet of Things including guaranteed:
  ▪ Committed Information Rates
  ▪ Availability and Resiliency
  ▪ Access diversity where required
  ▪ Service level Agreements

A Fragmented Health Sector

- ~12,000 Health Provider Entities
- ~123,000 health workers
- ~15,000 premises located throughout NZ
- Broad mix of public and private businesses
- 4.5M potential customers
- Cities, towns and rural

Health Application Providers

Communication Services

WWW.

DHBs

Emergency Services

Healthcare Centres

INTEGRATED INTEROPERABLE
Access to applications & communication capability

Pharmacies

Laboratories

Specialist Clinics

Hospitals

Healthcare Workers

Diagnostic services

Creates incredible complexity for ICT delivery

Connected Health: A Network of Networks

Based on accreditation of service providers and certification of services

Connected Health – a "network of networks"
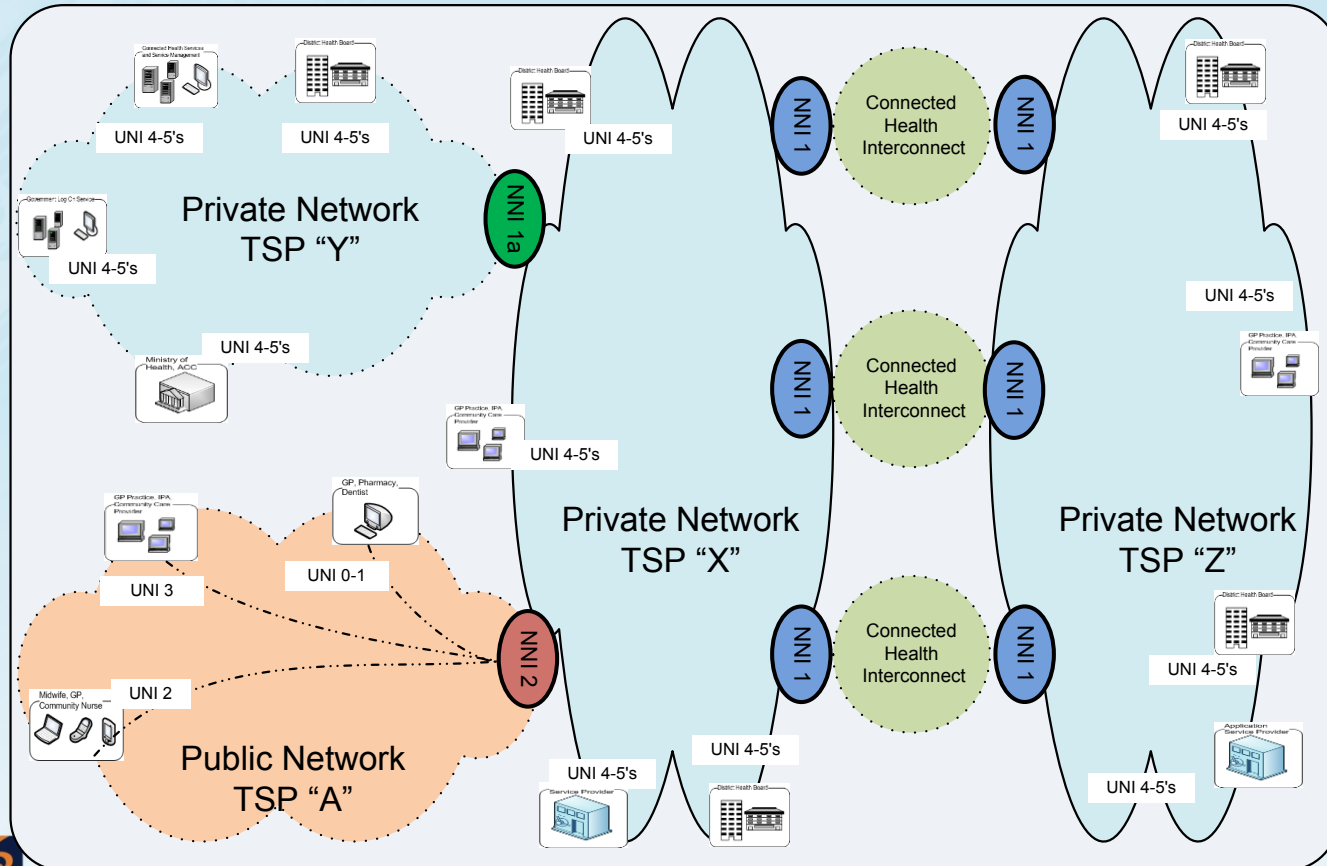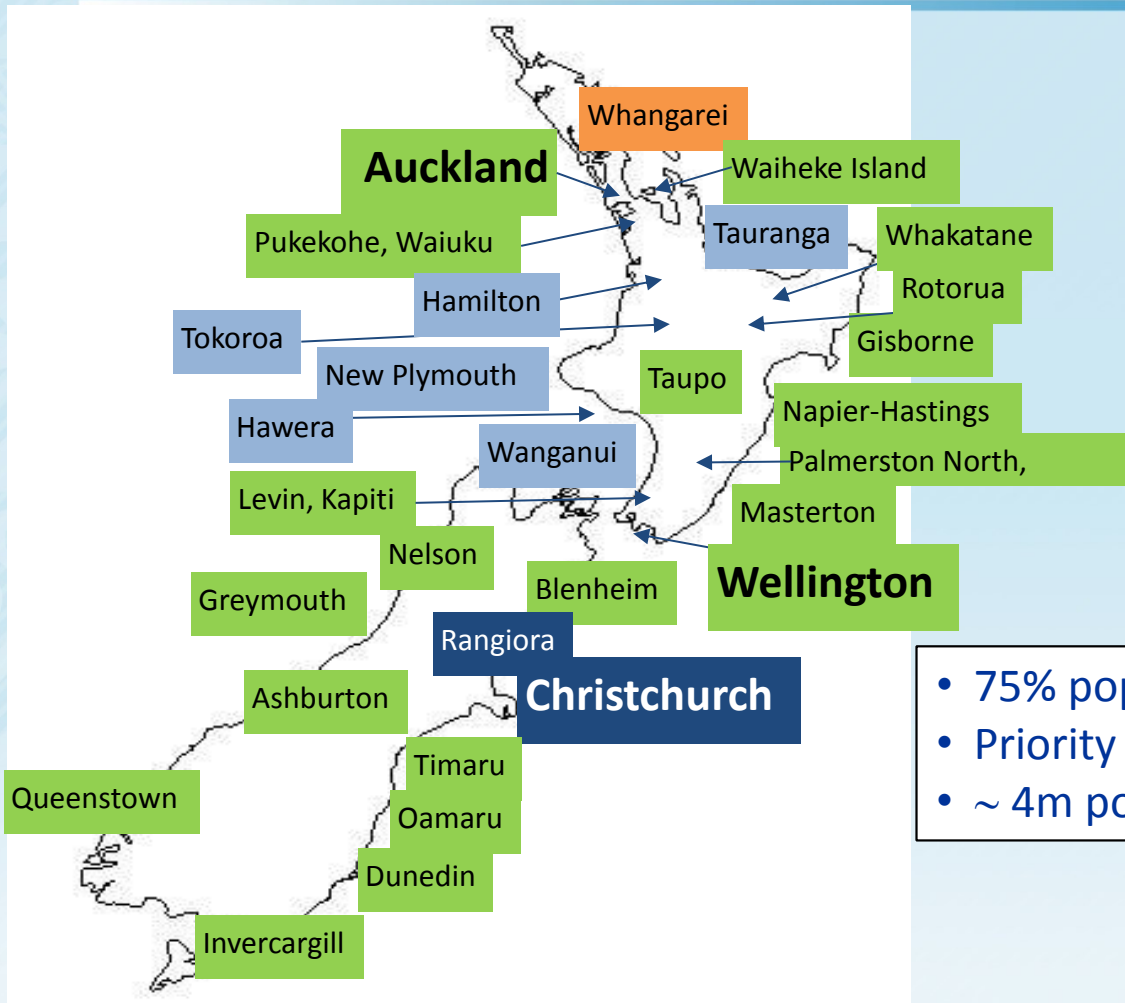
UFB and RBI as part of Connected Health

❑ Ultrafast Broadband (UFB) initiative delivers much improved broadband services at low cost to URBAN areas

- 75% of NZ homes and businesses
- 33 Candidate urban areas

❑ Rural Broadband Initiative (RBI) delivers much improved broadband services to RURAL areas

- 24.8% of homes and business in rural NZ
- From 75% coverage to 99.8% coverage

❑ Combination can deliver greatly enhanced capability for the support of emerging models of Healthcare within the Umbrella of Connected Health
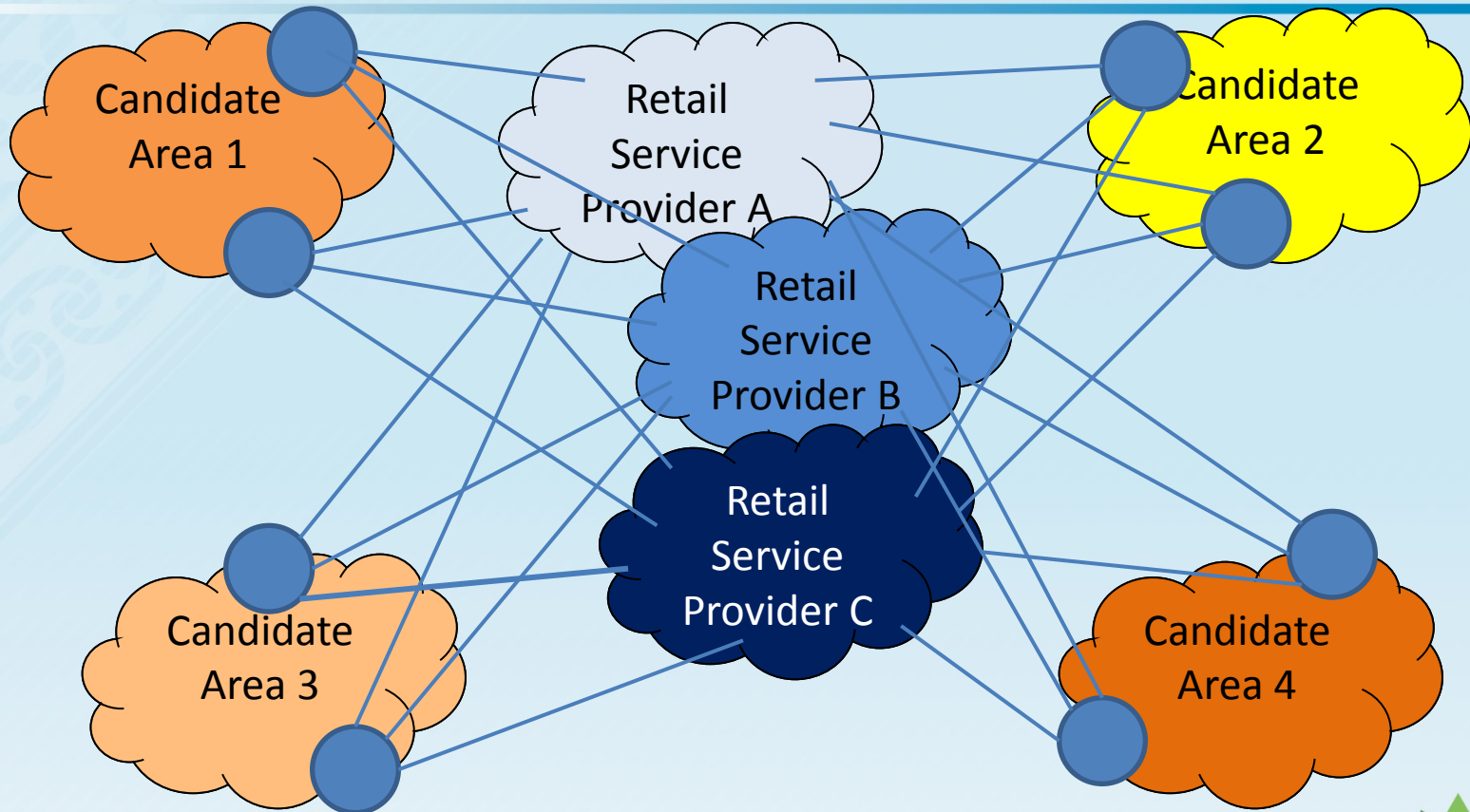
UFB Candidate Areas

	Candidate Areas	% of UFB
enable NETWORKS	2	15.3
Northpower	1	1.6
Chorus	24	69.4
WEL NETWORKS	6	13.7
	33	**100.0**

Map labels: Whangarei, Auckland, Waiheke Island, Pukekohe, Waiuku, Tauranga, Whakatane, Hamilton, Rotorua, Tokoroa, Gisborne, New Plymouth, Taupo, Hawera, Napier-Hastings, Wanganui, Palmerston North, Levin, Kapiti, Masterton, Nelson, Wellington, Greymouth, Blenheim, Rangiora, Christchurch, Ashburton, Timaru, Queenstown, Oamaru, Dunedin, Invercargill

- 75% population - end 2019
- Priority Users - end 2015
- ~ 4m pop, 1.3m dwellings/business premises

UFB: Access Aggregation within Candidate Areas

Candidate Area 1

Candidate Area 2

Candidate Area 3

Candidate Area 4

Retail Service Provider A

Retail Service Provider B

Retail Service Provider C
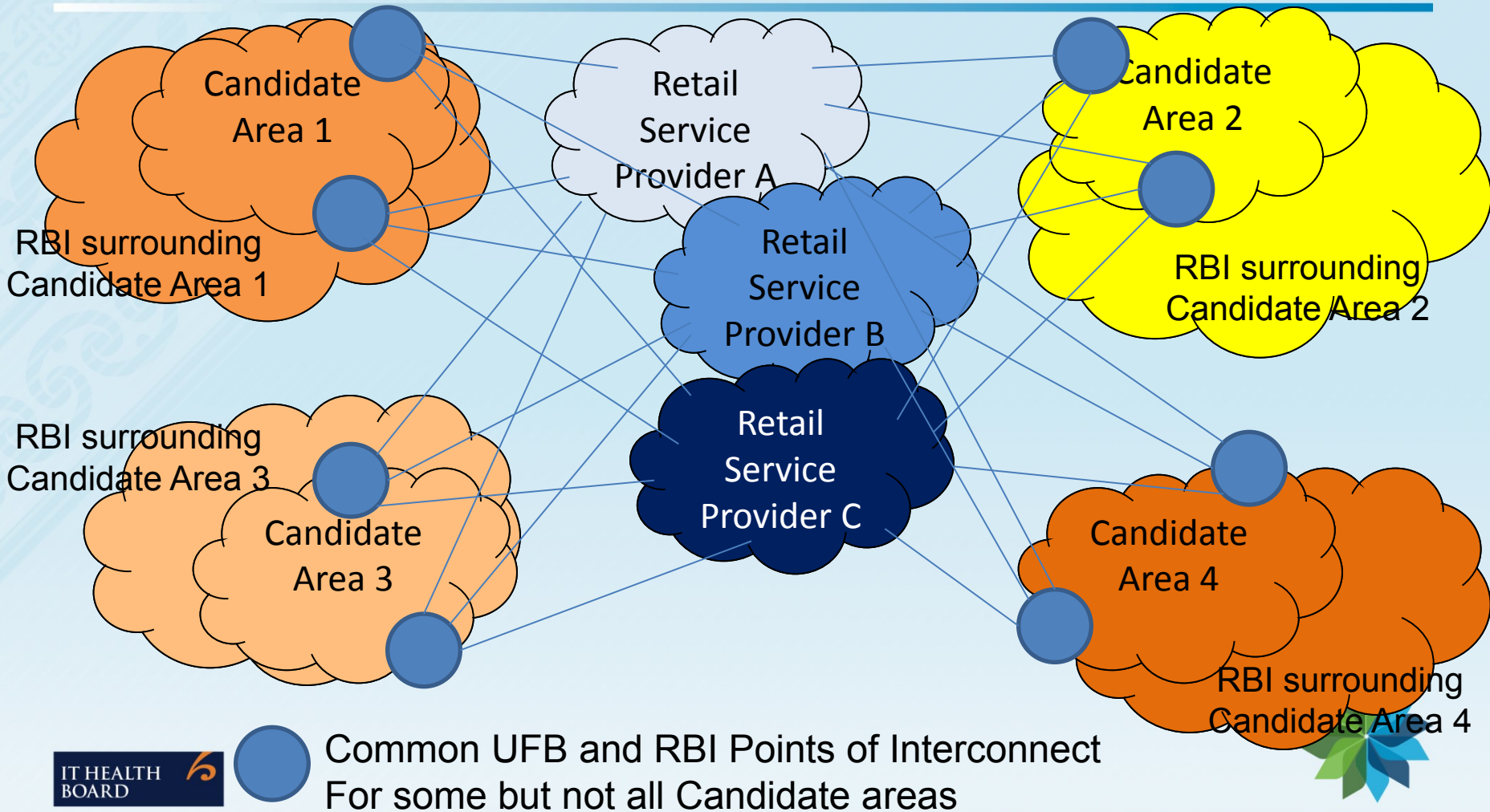
UFB Points of Interconnect
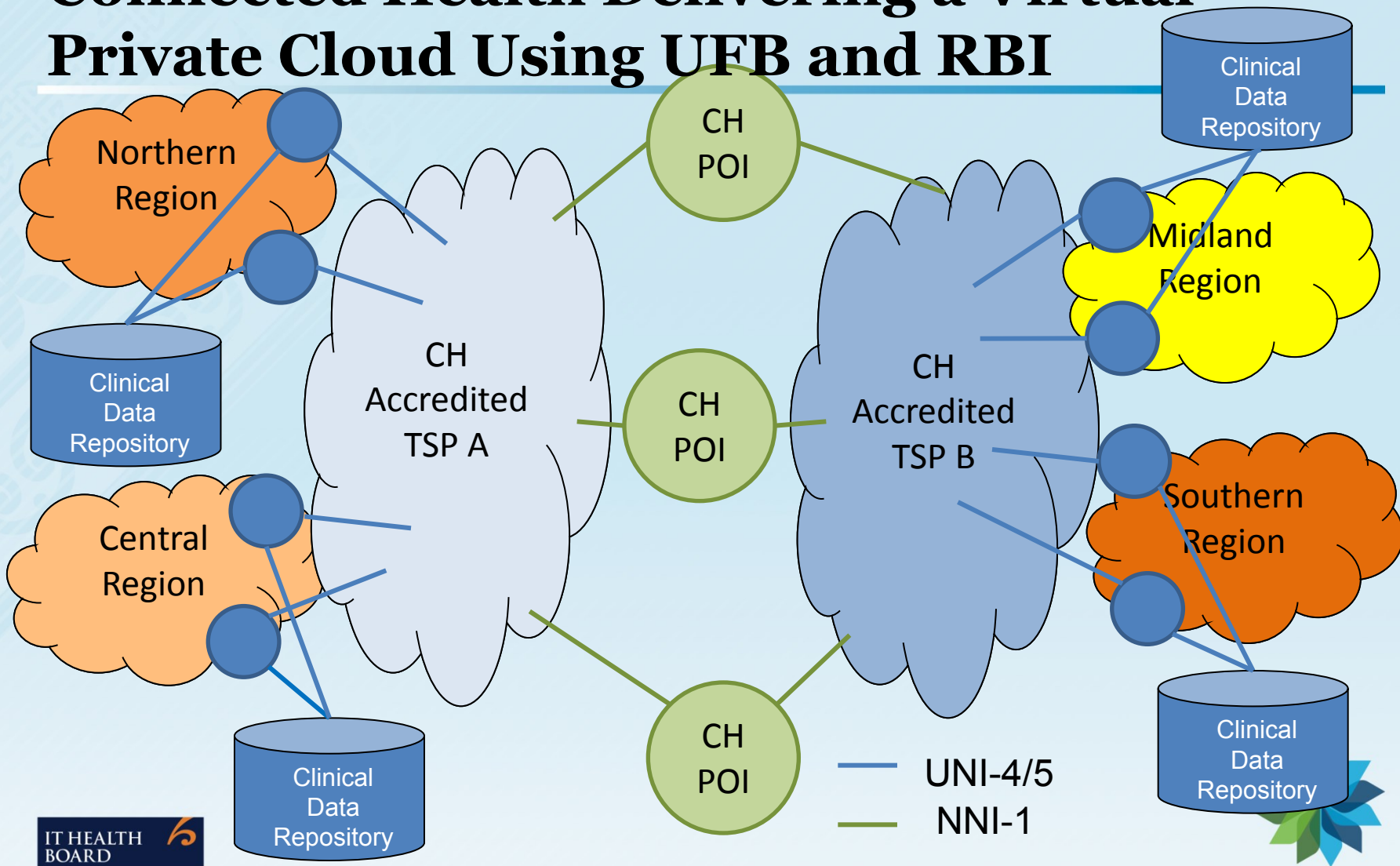(Two in all areas over 50,000 premises)

The RBI Outcome At A Glance
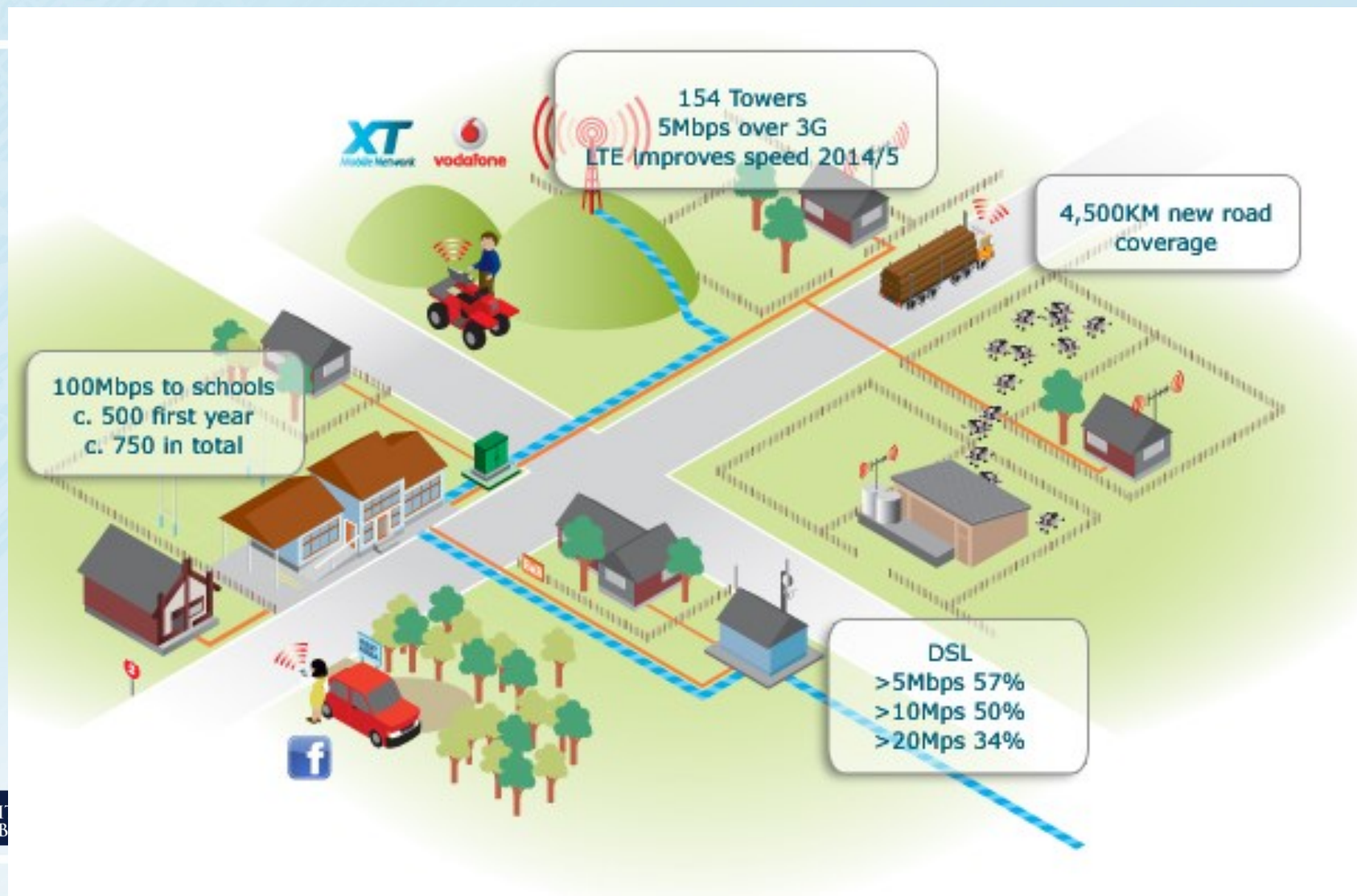
UFB and RBI Integration within Candidate Areas

Connected Health Delivering a Virtual Private Cloud Using UFB and RBI

UFB: Within a Candidate Area

MINISTRY OF HEALTH
MANATŪ HAUORA

Hospital

Cabinet

Central Office

Optional drop diversity

Protected ring

General Practice

Cabinet

Layer 1/2 Backhaul

Retail Service Providers

Point of Interconnect

Pharmacy

Cabinet

Central Office

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UFB = Government Ultra-fast broadband initiatives. Diagram courtesy of Crown Fibre Holdings
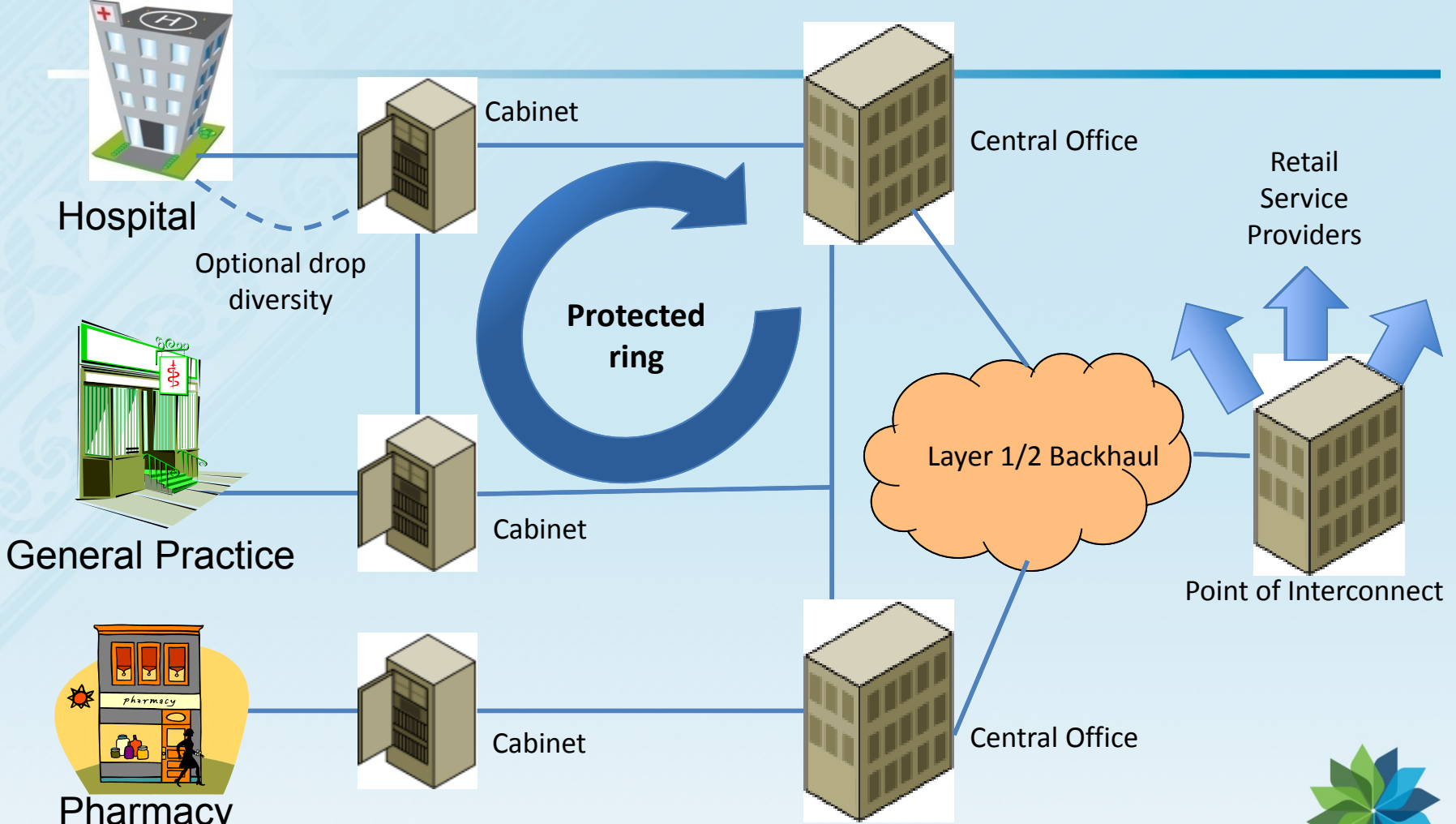
Example UFB Business Products

$1,500

$750

$380

$455

100 Mbps   1 Gbps

■ 2011 market price

□ Year 1 UFB price
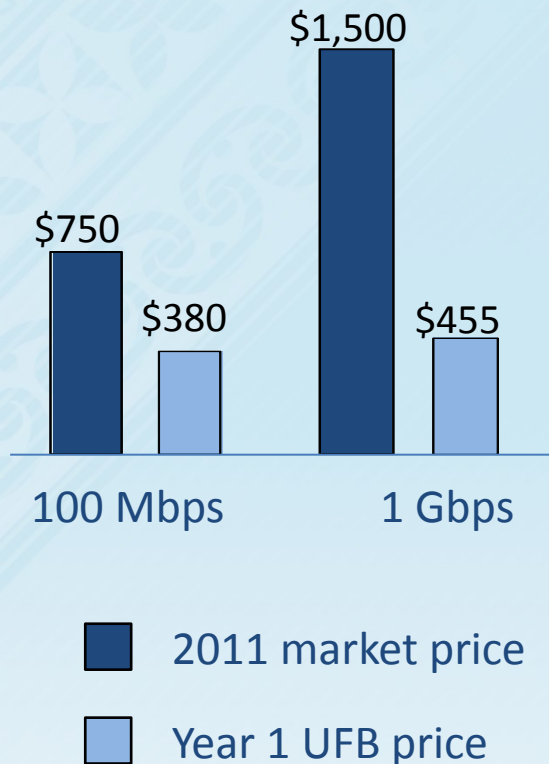
Note: Wholesale prices per month ex GST.

❑ In the Business market, UFB offers symmetric services at much lower than current market prices, with flexible service characteristics

❑ For Health these will enable:

- Private Health Cloud computing
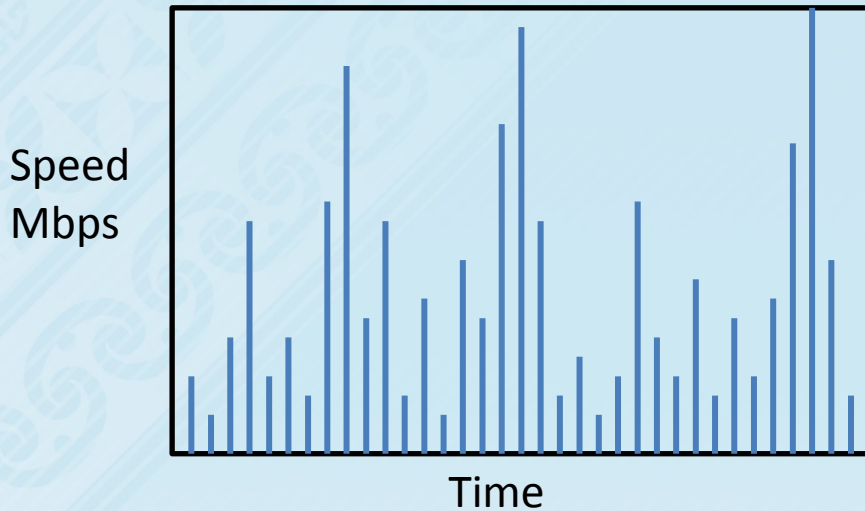- Improved Connected Health performance and cost effectiveness (particularly in smaller towns)
- Health Intranet of Things

❑ A lower cost and with improved end to end performance

UFB Service Characteristics

Typical Broadband Traffic Profile

Service Parameters

Speed Mbps

Time

PIR

EIR

CIR

Time
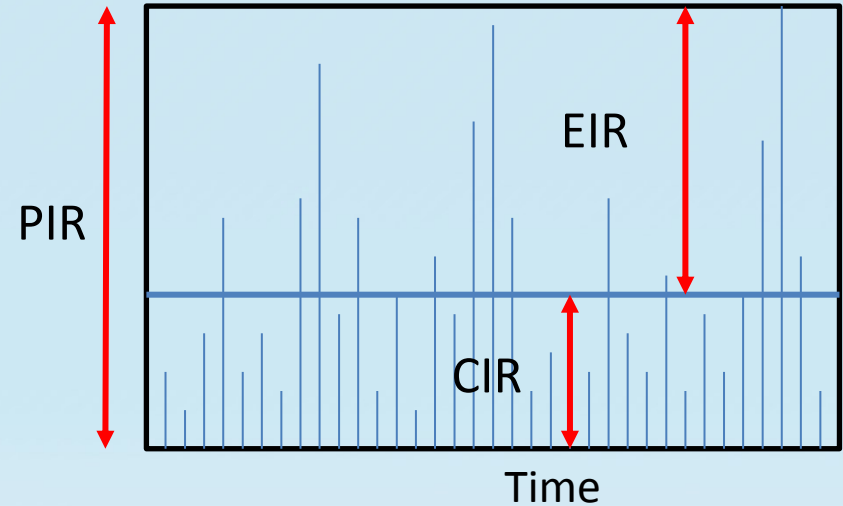
Traffic Class	Frame Delay	Frame Delay Variation	Frame Loss
CIR	<= 5 ms	<= 1 ms	<= 0.1%
EIR	n/a	n/a	<= 2%

UFB Service Characteristics

Service	PIR Up (Mbps)	PIR Down (Mbps)	CIR (Mbps)	EIR (Mbps)	Wholesale Data Cap
GPON Res.	10	30	2.5 min/10 max	PIR-CIR	No
GPON Bus & Res	50 or 100	100	2.5 min/10 max	PIR-CIR	No
P2P 100M	100	100	10 min/100 max	PIR-CIR	No
Bitstream 3	2.5 min to 100 max	2.5 min to 100 max	CIR = PIR	EIR = 0	No
P2P 1G	1G	1G	100 min/1G max	PIR-CIR	No
P2P 10G	10G	10G	1G min/10G max	PIR-CIR	No
Bitstream 4	100 min/1G max	100 min/1G max	CIR = PIR	EIR = 0	No
Dark Fibre	User defined	User defined	User defined	User defined	No

Notes:
- Dark fibre POIs can be different to Layer 2 POIs
- Access Diversity available for P2P services upon request

UFB Performance Characteristics

❑ SLAs for Provisioning, Availability, Traffic

❑ Eg. Availability

- Layer 1 and 2 SLAs

- Maximum and Average targets

- Default and Enhanced Service Level Agreements (SLAs) suitable for hospitals and medical centres

- Geographically diverse access available on request

Service Type	Default	Enhanced 1	Enhanced 2	Enhanced 3
Layer 1 Maximum Downtime	<= 48 hrs	<= 24 hrs	<= 12 hrs	<= 8 hrs
Layer 1 Average Downtime	<= 2 hrs	<= 2 hrs	<= 2 hrs	<= 2 hrs
Layer 2 Maximum Downtime	<= 12 hrs (excl. ONT)	<= 12 hrs (incl. ONT)	<= 8 hrs (incl. ONT)	n/a
Layer 2 Average Downtime	<= 30 mins	<= 30 mins	<= 30 mins	<= 30 mins

RBI Service Characteristics

Similar to UFB but with subtle differences

Media	Service	PIR Up (Mbps)	PIR Down (Mbps)	CIR	EIR	Wholesale Data Cap
FTTN	UBA	1.5 max	24 max	50 kbps max	PIR-CIR	No
FTTN	E-UBA	1.5 max	24 max	200 kbps max	PIR-CIR	No
FTTN	VDSL2	10 max	50 max	200 kbps max	PIR-CIR	No
Fibre	Bitstream 3	2.5 min to 100 max	2.5 min to 100 max	CIR = PIR	EIR = 0	No
Fibre	Bitstream 4	100 min/1G max	100 min/1G max	CIR = PIR	EIR = 0	No
Fibre	Dark	User defined	User defined	User defined	User defined	No
Wireless	HSPA	5 max	5 min	CIR = 0	EIR = PIR	Yes

Notes:
- Dark fibre POIs can be different to Layer 2 POIs
- Access diversity not widely available

RBI: Performance Characteristics

❑ Lack of enhanced wholesale SLAs

- RBI wholesale services only offer a single SLA
  - Maximum 48 hour restoration time -> 99.4% availability for one event in 12 months
  - Cf. Options of 24, 12 and 8 hour maximum restoration time -> 99.7%, 99.86% and 99.9% availability respectively

- No requirement for average downtime < 2 hours per premise per 12 months per candidate area

❑ Some sites will require diverse access protection

- Most RBI locations can only be provided with "best efforts" wireless

When?

❑ UFB

- Priority premises including health to be passed by YE 2015
- Many health premises will be configured to this architecture from 2012/13

❑ RBI

- Rollout across most of rural NZ by YE 2015
- Fibre and FTTN will be early deliverables
- Covers many rural health facilities

Networks being designed today need to take this architecture into account

The Good News for Health

❑ The Health Regions are beginning to take advantage of these capabilities eg. Midland and Southern
   ▪ Central is specifying its regional network requirements currently
   ▪ HBL is defining requirements to support FPSC
❑ GPNZ has selected SNAP as a preferred provider to supply services for their community
   ▪ SNAP is Connected Health Accredited and supports both the UFB and RBI products
❑ Many Health facilities in rural NZ are located close to schools and so can access fibre based RBI capability
   ▪ Most other sites will be able to use the UBA and VDSL2 based services via FTTN
   ▪ Few health sites will be connected via wireless only (Wireless access will be an important resilience capability)

Many Combinations of UFB and RBI in Health

❑ Examples:

- Base hospital in UFB, remote hospital or IFHC in RBI (eg. Northland)

- Base hospital located in UFB delivering Telehealth services into RBI (eg. West Coast)

- One part of a shared services virtual hospital in UFB and another part in RBI (eg. Central Otago)

- Parts of a virtual IFHC in UFB with satellite GP and other services located in RBI (eg. North Auckland)

- Parts of Whanau Ora in UFB and parts in RBI (eg. Taranaki)

- IFHC in UFB with patients in UFB and RBI using Telemonitoring

Central Otago Example
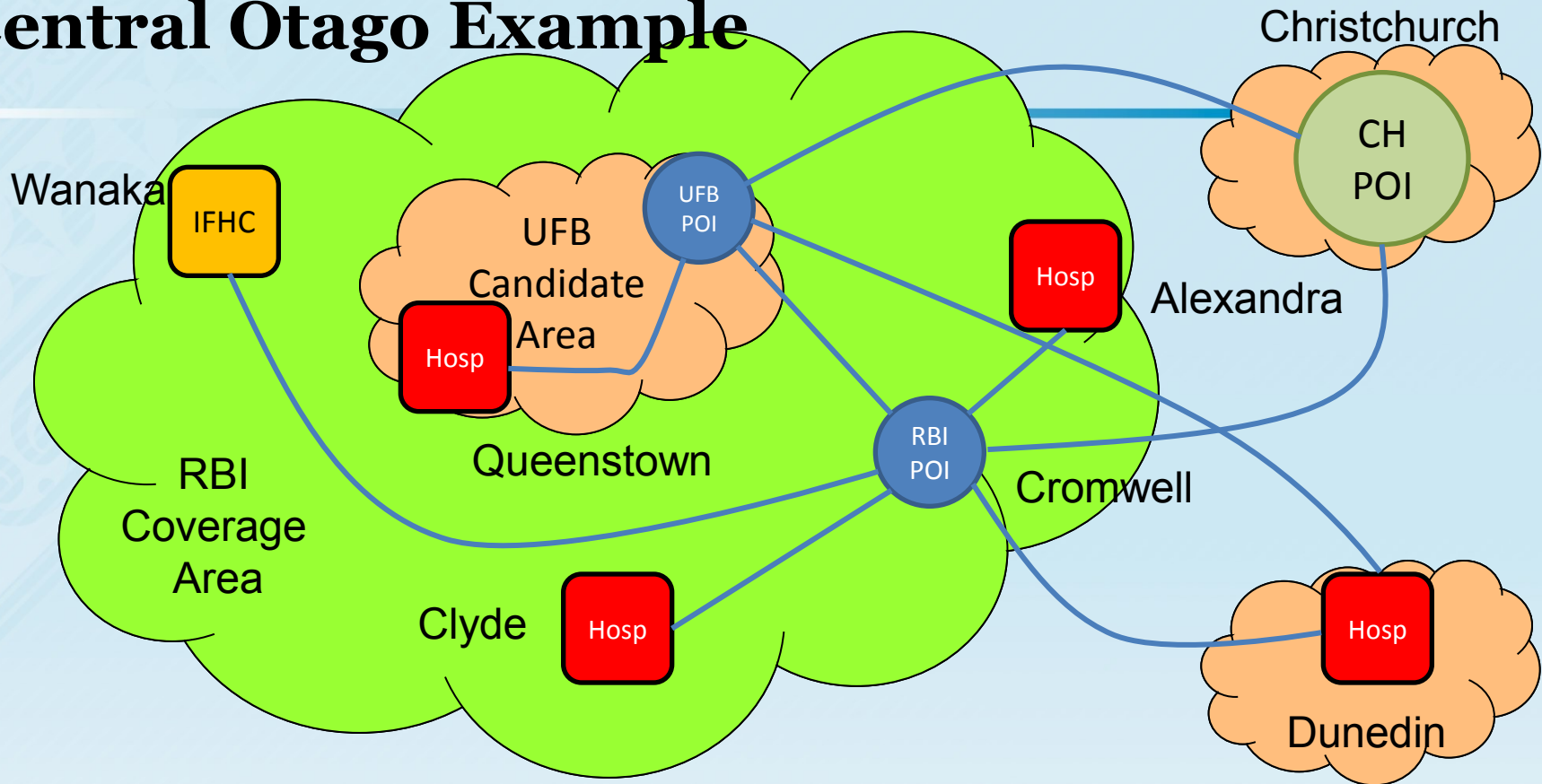
There is some Networking complexity introduced through working across UFB and RBI boundaries

Conclusions

❑ Health is developing a Private Cloud based Intranet of Things in order to help deliver the Triple Aim for Health

- Providing an improved continuum of care across all health facilities with electronic information collected at source
- Consistent and comprehensive patient information for all authorised health practitioners and the patients themselves
- Leading to Safer delivery of care across the health system and Increased financial sustainability for the Health Sector

❑ Requires greatly enhanced connectivity across the sector

- UFB and RBI provide a new paradigm for the delivery of the required connectivity wherever that care may be required
- Available widely today and increasingly through to YE 2015

Thanks for your Attention
Your Questions are Welcome

Dr Murray Milner

Chair, National Health IT Board