StarHub Seminar

Provision of Building Facilities for info-communications

Valerie Ang

28th April 2006

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Provision of Building Facilities for info-communications

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INTRODUCTION

- Telecommunication Facilities Coordination
- Committee (TFCC)
- CORENET E-Submission system
- Code of Practice For Info-
- Communications Facilities in buildings (COPIF)
- Broadband-Ready
- Certification of Broadband Coaxial Cable Readiness

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TELECOMMUNICATION FACILITIES COORDINATION COMMITTEE (TFCC)

- A committee appointed by IDA to coordinate the submission, endorsement and approval of proposed building facilities for telecommunications needs in new developments

- StarHub and SingTel are both appointed by IDA to manage the TFCC activities

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STARHUB TFCC COORDINATOR

Manager

Network Infrastructure & Development

StarHub Ltd

3 Tai Seng Drive
#04-00 Da Vinci Building
Singapore 535216

Fax: 68217000

Email: corenet@starhub.com

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PLAN SUBMISSION

- Owner/developer are required to submit architectural drawings through CORENET e-Submission system:

- CORENET E-Submission system is mandated by IDA and commence with effect from July 2004 for all types of building
- It is a one-stop submission for Telecommunication and Broadband Coaxial Cable System (BCS)

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TIME FRAME FOR THE PROCESSING OF E-CORENET

- Acknowledge within 3 working days
- Approve or comment within 3 weeks

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CODE OF PRACTICE FOR INFO-COMMUNICATIONS FACILITIES IN BUILDINGS (COPIF)

- Guidelines to ensure that architects and construction professionals provide adequate in-building cabling facilities and space required for the operation of installations and plants used by the public telecommunication licensees (PTLs) and telecommunication systems licensees (TSLs)
- Current COPIF is 15 September 2000 version

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RESPONSIBLILITES OF BUILDING OWNERS OR DEVELOPERS

- Maintenance of all the facilities within the building including the cable trays, trunking and ducts by the owner or developer

- Owner or developer is required to pay for all costs and expenses incurred for any diversion of PTLs /TSLs cable or equipments

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REQUIREMENTS FOR THE PROVISION OF SPACE AND FACILITIES FOR TELECOMMUNICATIONS

- ❑ 110mm uPVC lead-in-pipes and associated underground ducting system if applicable within the property boundary line
- ❑ MDF room / TER room with a clear headroom of 3.5m
- ❑ Telecom riser
- ❑ Cable tray (600mm, 450mm and 300mm)
- ❑ MCT if the MDF is at the basement. No MCT can be mounted directly inside the MDF room.

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NUMBER OF LEAD-IN-PIPES FOR COMMERCIAL BUILDINGS

Usable Floor Area (per '000 sq m)	Total Nos of lead-in-pipes	Pipe Formation
Up to 20	8	2 x 4
20 to 40	12	3 x 4
40 to 60	18	2 sets of 3 x 3
60 to 80	24	2 sets of 3 x 4
80 to 120	36	2 sets of 3 x 6
120 to 160	48	2 sets of 4 x 6
160 to 200	60	2 sets of 5 x 6

Table 1. Number of lead-in-pipes depend on usable floor area under COPIF 4.3.1

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MDF ROOM FOR COMMERCIAL BUILDING

Usable Floor Area (per '000 sq m)	Telecom MDF Room (sq m)	Customer's MDF Room (sq m)
Under 2	13 to 20	7.5 [3.0m x 2.5m]
2 - 12	20 to 30	9 [3.0m x 3.0m]
12 - 25	30 to 40	10.5 [3.5m x 3.0m]
25 - 50	40 to 60	20 [5.0m x 4.0m]
50 - 75	60 to 80	24 [6.0m x 4.0m]
75 - 100	80 to 100	35 [10.0m x 3.5m]

Table 2. MDF room size depend on usable floor area under COPIF 5.2.2

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PROVISION OF COMMERCIAL RISER DUCT

- For commercial and industrial buildings, the size of riser duct shall depend on usable floor area:
  - Up to 60,000 sq.m: 1100 mm x 600 mm
  - More than 60,000 sq.m: 1600 mm x 800 mm

- For more information on commercial services, please call our **Business Hotline at 1800 - 888 8888** or you can also email to us at

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NUMBER OF LEAD-IN-PIPES FOR FLATS AND CONDOMINIUM

No. of units	No. of Lead-in Pipes
2 to 19 units	4 (2 x 2)
20 to 120 units	6 (2 x 3)
above 120 units	8 (2 x 4)

Note: Where MDF room is linked by underground pipes to other TER room within the same boundary, the number of lead-in pipes shall be increased

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MDF ROOM AND TER ROOM FOR FLATS AND CONDOMINIUM

- MDF room shall be provided for each development
- If the development has more than 1 block, each block must have 1 TER room
- For Condominium development that has more than 200 units, MDF room size will depend on usable floor area under COPIF 5.2.2

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MDF ROOM AND TER ROOM FOR FLATS AND CONDOMINIUM

- Else if the number of units is less than 200, follow the size of MDF as shown in below table:

No. of units	Size of MDF / TER Room
2 to 9 units	2m x 2m
10 to 19 units	2m x 3m
20 to 59 units	3m x 3m
60 to 120 units	3m x 4m
Above 120 units	4m x 4m

- For residential buildings, the size of riser duct shall be 600 mm x 600 mm

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REQUIREMENTS FOR THE PROVISION OF SPACE AND FACILITIES FOR BCS SYSTEM

- ❑ 2 x 110mm uPVC pipes
- ❑ CDR room of dimension 1m (W) x 0.5m (D) x 2.7m (H)
- ❑ 3 number of 13 Amp single phase AC outlet with a separate DB in the CDR
- ❑ 1 number of clean earth and ventilation in the CDR
- ❑ Riser size of 450mm (W) x 300mm (D), door at 450mm side
- ❑ Riser to every housing unit and TV point shall not be more than 50m

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LANDED ARE CLASSIFIED INTO 4 DIFFERENT CATEGORIES

- Single Unit – 1 unit redevelop to 1 unit
- 1:n – 1 unit redevelop to two or more units
- Cluster – 1 plot of land developing into cluster of multiple units
- Strata Title – multiple units within a compound with common facilities and common entrance

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REQUIREMENTS FOR LANDED

- 2 x 50mm UPVC pipes for telecommunications from meter compartment under crossed the drain to the road boundary
- 1 x 50mm UPVC pipes for BCS from meter compartment under crossed the drain to the road boundary
- 2 x 50mm UPVC pipes from inside landed premises to meter compartment
- Cross-sectional area of meter compartment
- All Cable TV outlets

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WHY A BROADBAND READY HOME?

Getting your home connected to StarHub's island-wide broadband network that allows you to enjoy clear reception of free-to-air channels, 24 hours of world-class news, information and entertainment on cable TV, broadband Internet access, digital voice service that offers telephony, and in the future, other digital interactive services.

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WHAT IS BROADBAND-READY?

The term "broadband-ready" is used by StarHub to denote that a house has in place, a proper cable system that allows it to connect to StarHub's broadband network. It means that the cable system has a complete set of StarHub-approved network components such as cables, taps, splitter, booster and cable point outlets.

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CABLE MATERIALS AND CABLE ROUTINGS

- The approved materials, which should be used to get your house broadband-ready include cable, tap, splitter, booster and cable point outlet

- Home wiring system

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SERVICE TYPE A ~ Materials Qualification

- The Material Qualification service is applicable when you are renovating your home and wish to engage StarHub to qualify that your contractor uses the approved materials.

- In other words, it is a service to determine if the materials used are within the COPIF specifications.

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SERVICE TYPE A ~ Materials Qualification

- StarHub provides such a service at an affordable rate [link to Schedule of Rates] per appointment.

- StarHub will assign a senior technician to your house to inspect your cables and other network components installed or to be used by your contractor.

- The StarHub senior technician will provide you with the 'Materials Qualification Result', which indicates whether your materials are qualified.

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SERVICE TYPE A ~ Material Qualification

- This qualification is solely for the purpose of determining whether the materials to be used by your contractor are StarHub-approved types.
- It does not guarantee that the completed cable system installed by your contractor is suitable for connection to StarHub's network.
- Poor workmanship, damage to materials and wrong materials used for the actual installation may render your cabling system unsuitable for connection or lead to signal leakage.
- This may cause disruption to your TV reception or interfere with national communication services

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SERVICE TYPE B ~ Broadband-Ready Testing

- The Broadband-Ready Testing service is applicable for 'broadband-ready' homes before they can be connected to StarHub's network. StarHub provides this service at an affordable price [link to Schedule of Rates].

- StarHub will assign a contractor to your house to inspect your cabling system. In the event that any part(s) of the system fails, we will be unable to connect your home to StarHub's network. If your cable is of a non-approved type, you will have to re-lay, using an approved cable at your cost.

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SERVICE TYPE C ~ New/Reconnection

- For houses which were not connected to StartHub's network before its reconstruction, a Connection Fee at S$2,352 or S$5,952 (S$2,469.60 or S$6,249.60 w/5%GST) is applicable.

- If you are an existing StarHub customer who has paid a connection fee of either S$2,352 or S$5,952 (S$2,469.60 or S$6,249.60 w/5%GST) and wishes to renovate or rebuild your home, charges applies. Please see schedule of rates [link to Schedule of Rates]. Charges do not include the charges for the pipe link to StarHub's network.

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Schedule of Rates

Item	Cost	Remarks
Reconnection Fee	S$200.00 (S$210.00 w/5%GST)	Excludes any construction works
Internal Cabling*	S$200.00 (S$210.00 w/5%GST) S$100.00 (S$105.00 w/5%GST)	First cable point Subsequent point
Cable Outlet	S$40.00 (S$42.00 w/5%GST)	Per outlet
Broadband-Ready Testing	S$50.00 (S$52.50 w/5%GST)	Per appointment
Material Qualification	S$30.00 (S$31.50 w/5%GST)	Per appointment
Transport Charge	S$30.00 (S$31.50 w/5%GST)	Per appointment

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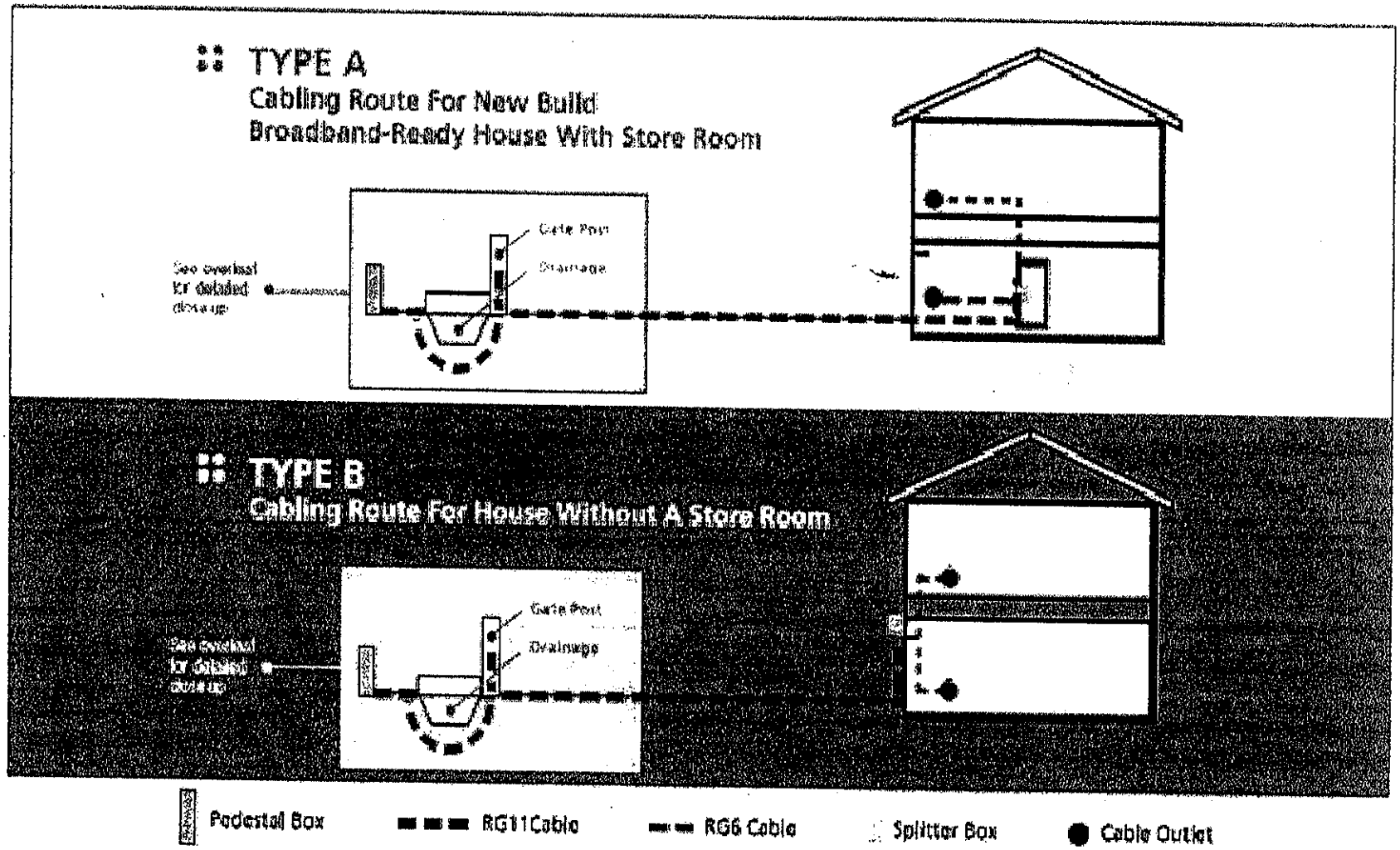
Cabling Routes for Landed Houses



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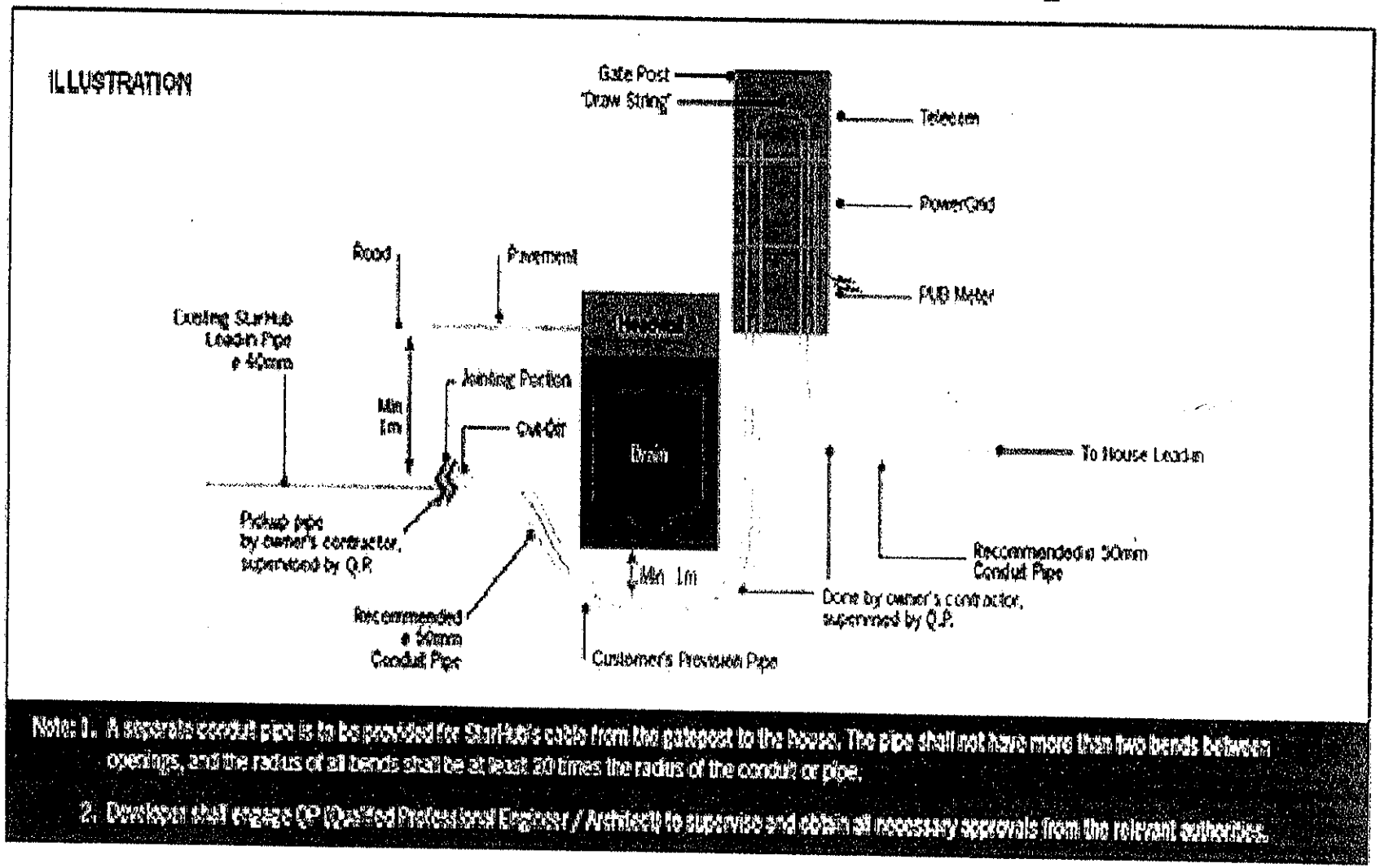
Connection to StarHub's Lead-In Pipe



Note: 1. A separate conduit pipe is to be provided for StarHub's cable from the gatepost to the house. The pipe shall not have more than two bends between openings, and the radius of all bends shall be at least 20 times the radius of the conduit or pipe.

2. Developer shall engage QP (Qualified Professional Engineer / Architect) to supervise and obtain all necessary approvals from the relevant authorities.

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Note:

1. A separate conduit pipe is to be provided for StarHub's cable from the gatepost to the house. The pipe shall not have more than two bends between openings, and the radius of all bends shall be at least 20 times the radius of the conduit or pipe.

2. Developer shall engage QP (Qualified Professional Engineer / Architect) to supervise and obtain all necessary approvals from the relevant authorities.

Please contact StarHub's Cabling Hotline at 6873 2828 if you intend to renovate or rebuild your home to ensure all necessary provisions are made during construction.

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Material List

Below is a list of approved materials that should be used to get your house broadband-ready. Residents are advised to purchase these materials from StarHub (Materials Department) or call StarHub's Cabling Hotline at 6873 2828 for a list of StarHub-approved contractors to purchase from.

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RG11 Cable	Commscope F11SSEF (flooded) Duo Bond E108998(UL) (min. order is one drum)
RG6 Cable	Belden 1530A, 90% Braiding Duo Bond
Conduit for RG11	50mm UPVC supplied by (customer's own contractor)
TV Outlet	a) StarHub 1001A TV/FM Isolator (Face down) b) StarHub 1001B TV/FM Isolator (Face front) c) StarHub Logo Single Barrel Wall Plate
Splitter	3 way (GRS3DGH); 4 way (GRS4DGH); Regal 8 way (GRS8DGV)
Indoor Booster (Optional)	Distribution AMP model AM-2FORWARD/15 (15dB)
Connector	Ultrasealed Gilbert RG 6 and RG 11
Splitter Box	Watertight surface mounting moulded enclosure. Size: 380mm x 300mm x 120mm (supplied by developer or renovation contractor)

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Certification For Broadband Coaxial Cable Readiness

- With effect from 15 April 2004, IDA will only require and direct the following types of property to be cable ready:
  - Multi-tenanted residential buildings (e.g. condo/apartment)
  - Single-Landed (redevelop to 2 or more landed housing)
  - Multi-tenanted commercial buildings (e.g. Offices)
  - Mixed development – commercial & residential

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Certification For Broadband Coaxial Cable Readiness

- IDA will no longer require and direct the following types of properties to be cable ready and will only be recommend that these properties to be cable ready:
  - Single-landed housing (convert back to 1 unit)
  - Single-owner factory/warehouse, religious buildings, community centre, etc.

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Certification For Broadband Coaxial Cable Readiness

❑ Owner/developer requesting this certification for the purpose of TOP/CSC are advised to write to:

Manager
Broadband Cable Transmission
StarHub Cable Vision Ltd
2B/C Ayer Rajah Crescent
Singapore 139937
TEL: 67251507; **FAX:** 68206008

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STARHUB DIGITAL TERRESTRIAL RECEPTION

❑ DIGITAL TERRESTRIAL TV (DTTV)

- The wireless transmission of television signals using digital instead of the conventional analogue method

- The transmitted digital signals will be received via the rooftop antenna and distributed along the building's existing Master Antenna Television (MATV) distribution network

- Building owners will have to engage their own contractors to check for the reception of DTTV signals and for the installation of DTTV antenna

- 17 channels available for monthly subscription

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STARHUB DIGITAL TERRESTRIAL RECEPTION

❑ TYPES OF DTTV INSTALLATION

- o Stand-alone Installation

- o Distribution Installation
  - ➢ Down-conversion
  - ➢ UHF Individual Drop

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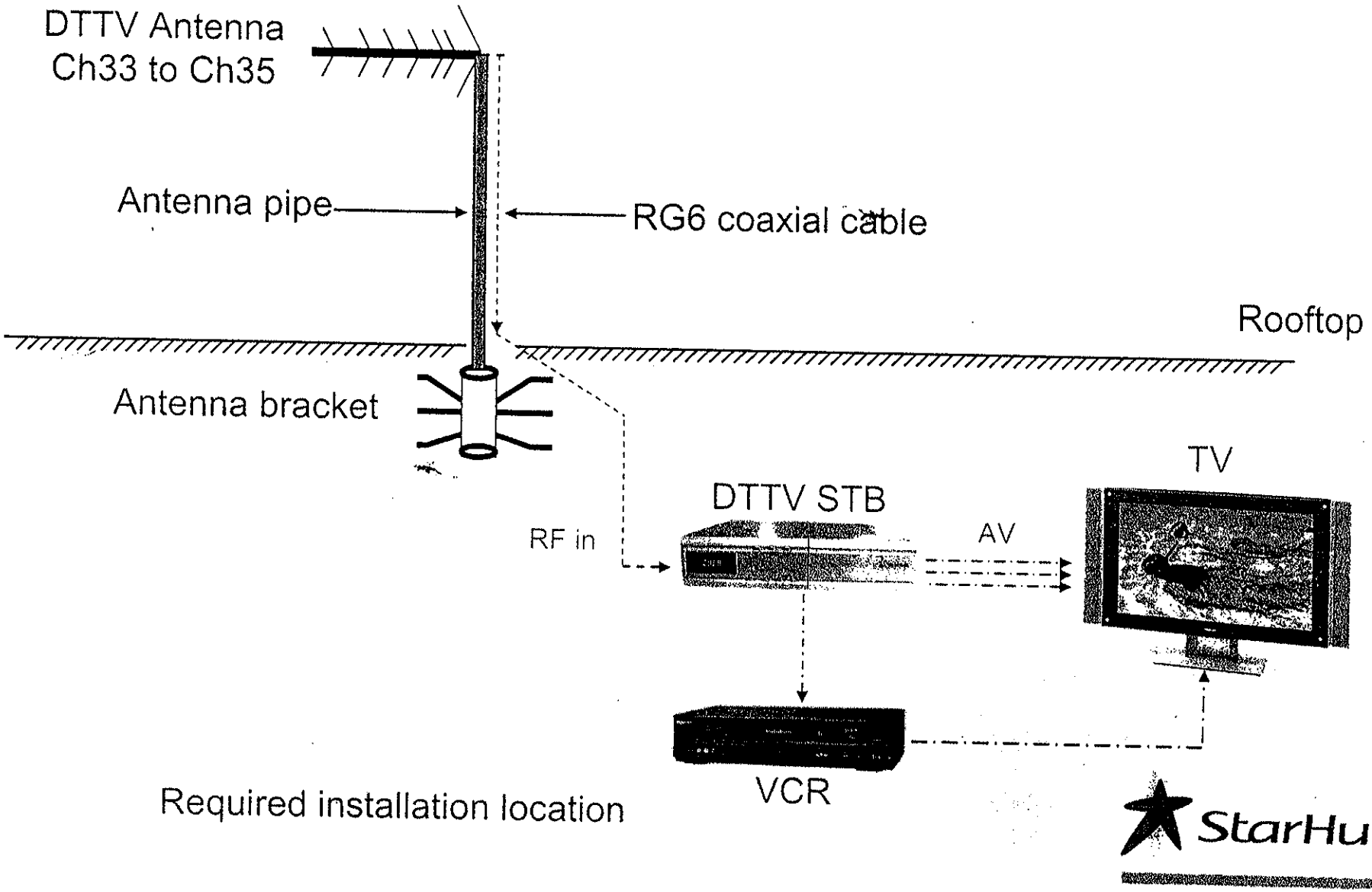
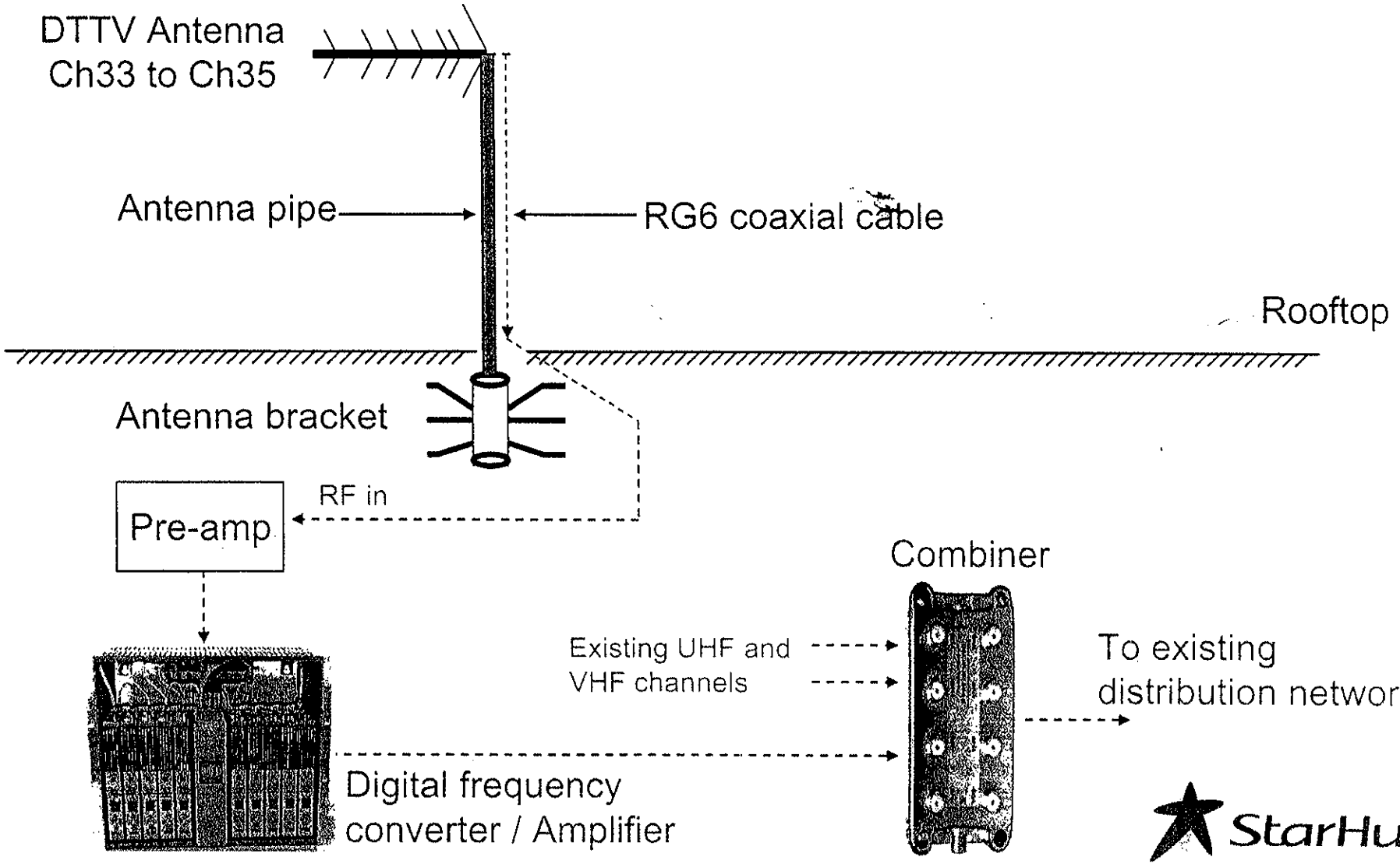
STARHUB DIGITAL TERRESTRIAL RECEPTION

Standalone Installation



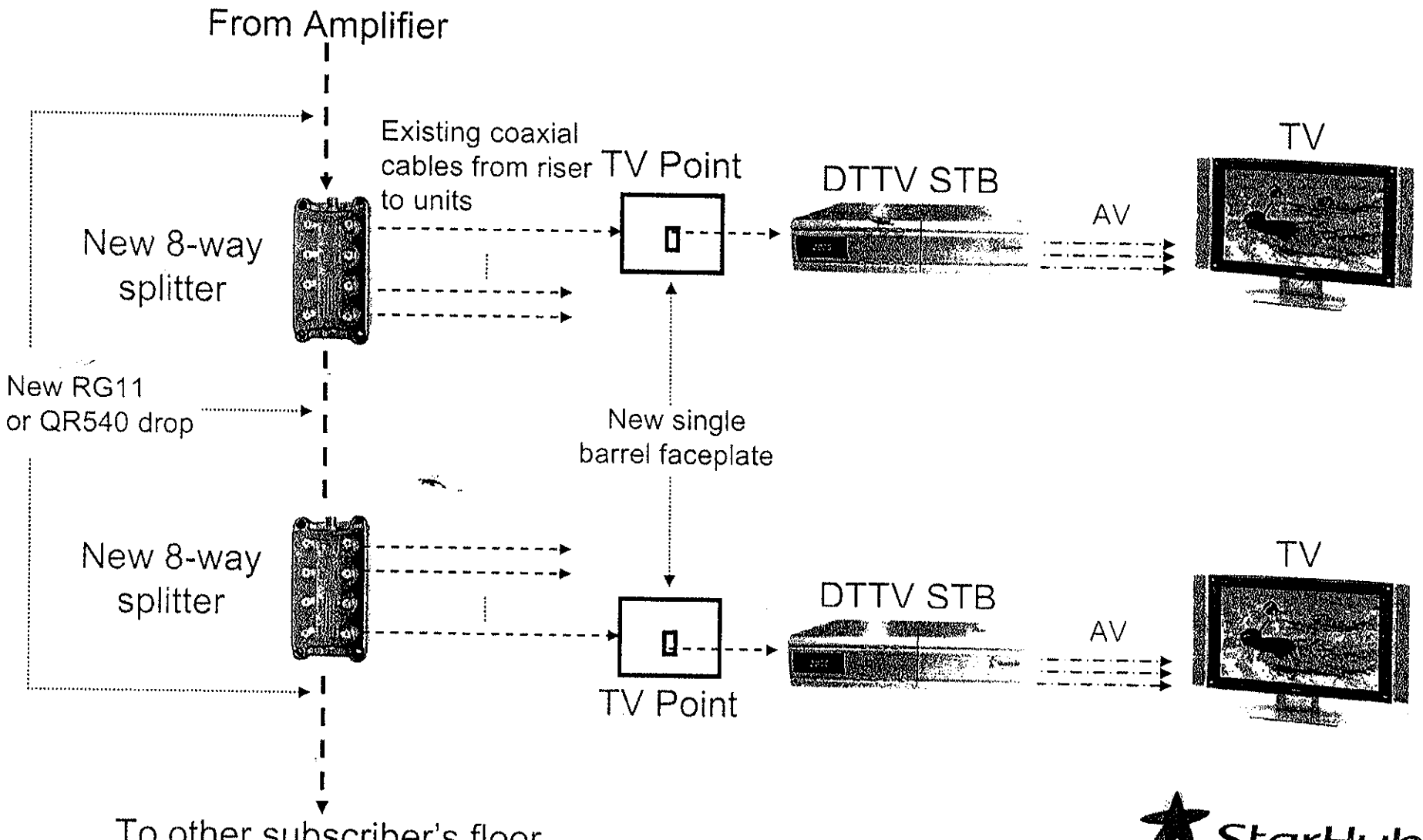
STARHUB DIGITAL TERRESTRIAL RECEPTION

Distribution Installation (Down-conversion)



STARHUB DIGITAL TERRESTRIAL RECEPTION

Distribution Installation (UHF Individual Drop)



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End of Presentation

THANK YOU !!

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StarHub Seminar

Earthworks Notification & Diversion

by

Khng Peng Ong

28th April 2006

StarHub

TCDW & Diversion

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Introduction

- Background
- Requirements under the Telecommunications Act
- Licencing of Cable Detection Workers

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Background

- Earthworks resulted in 18 major cable cuts in past 3 years
- Losses and inconvenience to businesses and private sector
- Typical causes of damage:
  - Use of old or expired plans
  - Carelessness
  - Inadequate precautions

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Telecommunications Act,
Section 29

- With effect from 01 July 2000:
  - iDA has implemented requirements for Telecommunications Cable Detection, under Section 29
  - Licencing scheme takes effect for Telecommunications Cable Detection Workers (TCDW)

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Requirements of the "Act"

Contractors carrying out earthworks within the *vicinity* of any telecommunication cable must:

- Obtain necessary information on the location of telecommunication cables from the telecommunication system licensee
- Consult the telecommunication system licensee on the steps to be taken to prevent cable damage

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Requirements of the "Act"

Contractors must:

- Engage licensed telecommunication cable detection worker to locate underground telecommunication cables

- Give notice to the telecommunication system licensee at least 7 days before earthworks

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Requirements of the "Act"

Contractors should:

- comply with all reasonable requirements of the telecommunication system licensee for the prevention of cable damage
- ensure that reasonable precautions are taken when carrying out earthworks
- allow the telecommunication system licensee reasonable access to the work site for the purpose of taking necessary measures to protect the telecommunication cable

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Definitions

- Earthworks

  a) any act of excavating earth, rock or other material (by whatever means) in connection with any works for or relating to:

  e.g. construction, renovation, repair of any road laying of pipes, etc.

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Definitions

- Earthworks

b) any act of boring, dredging, jacking, tunneling etc. on or under any premises or street by any mechanical means

c) the driving or sinking of any earth rod, casing or tube into the ground

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Reminder - the "Act" applies to:

Contractors carrying out
earthworks within the **vicinity** of
any telecommunications cable

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Emergency Works

A contractor can carry out earthworks without prior notice to the telecommunication system licensee provided that:

- it is necessary to do so in the interest of public or private safety; and
- the contractor gives the telecommunication system licensee a written notice not more than 7 days after the commencement of such earthworks

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Penalties Under the Act

Upon conviction, the contractor is liable for

- a maximum fine of $1 million; or
- a jail term of not more than 5 years;
- or both

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Licencing of Cable Detection Workers

To ensure that only qualified persons are engaged by contractors to locate underground telecommunications cables

- contractors must engage a TCDW for the detection of telecommunications cables

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Licencing of Cable Detection Workers

- A person who wishes to apply for the licence is required to complete a course in telecommunications cable detection work

- Joint course now run by StarHub, SCV & SingTel

- Those TCDW's trained prior to the joint course: licence is valid, need to ensure updated with new licensees infrastructure and requirements

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Introduction

- Background
- Diversion Procedures

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Background

- Diversion is required when the developer or contractor is developing/working on a piece of land or going to demolish existing structure

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Diversion Procedures

- After obtaining the Plant Map from StarHub and subsequently issued the notification to StarHub, the contractor must perform manual trial hole to locate the plant
- During the the trial holes, the contractor must observe the DOs and DON'Ts as recommended by StarHub

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Diversion Procedures

- If there is a need to divert the service plant, the contractor must do the following:
  - Write to inform StarHub requesting for diversion
  - The letter must contains:
    - A map showing the location of the plant that need to be diverted
    - Contact person

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Diversion Procedures

- A site meeting will be conducted and subsequently StarHub will followed up with the requestor on the following:
  - Proposed schedule
  - Estimated completion date
  - Estimated cost of diversion

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Diversion Procedures

- Before StarHub can proceed with the diversion, the requestor must procure the payment to StarHub
  - For contractor/developer/consultant/others, company cheque is required
  - For statutory board/government department, Work Order is required
- After the completion of the diversion, StarHub will inform the requestor on its completion

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Thank you for your attention

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Delivering Mobile Cellular Coverage in Residential Area

Eddie Teo
RF Engineering, StarHub

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Agenda

- Mobile Cellular Usage Trend
- Future Wireless Technologies
- RF Propagation Basic
- Challenges in Delivering Mobile Cellular Coverage
- Possible Way Forward
- Other Issues

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Mobile Cellular Usage Trend

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Mobile Cellular Usage Trend

Increasing Mobile Phone Subscribers

The number of mobile phone subscribers has been increasing aggressively over the past few years. The mobile phone subscribers reached 4,256,800 in December 2005. This translate to 97.8% penetration rate against the national population which means almost everyone owns a mobile phone.

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Mobile Cellular Usage Trend

Increasing Mobile Applications

- Short Message System
- Multimedia Message System
- Video Call
- I-mode
- Data Service
    - Video Streaming (EPL, Music Video etc)
    - Email system (Blackberry & Duality)
    - Internet Access

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Mobile Cellular Usage Trend

Increasing User Needs

Habits of mobile phone subscriber changed; not only use outside homes and offices but also in their homes and offices. Mobile phone coverage needs to extend to their living and working quarters. Owning mobile phone is no longer a luxury but basic needs.

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Future Wireless Technologies

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Future Wireless Technologies

Wireless Broadband Access Everywhere

With the recent announcement by Prime Minister Lee, the nation will be covered with wireless digital broadband network, whereby any wireless broadband users like Wifi & WiMax can access the high speed broadband network from anywhere (shopping centre, homes, offices, on-street etc).

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Future Wireless Technologies

Wireless Technologies Becoming a Basic Necessity

With developments in the wireless mobile broadband like 3.5G, 4G ... 10G.

Hence equipping the residential properties with wireless access technologies (like high speed broadband and cellular services) become a basic need in everyday life in the near future.

Wireless Access Ready Building

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RF Propagation Basic

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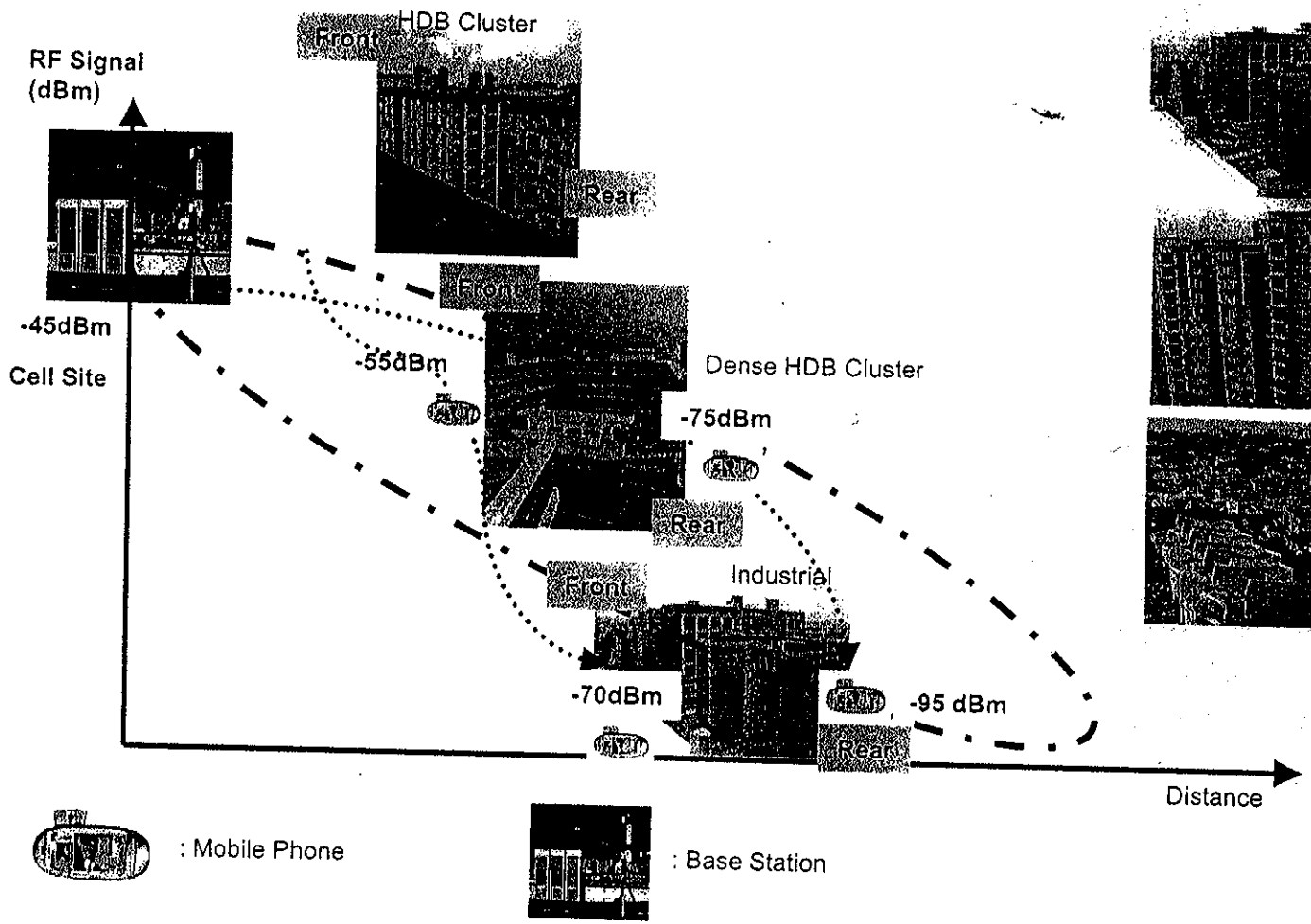
RF Propagation

- RF signals emitting from base station cell site are subjected to propagation and penetration losses, depending on the location of mobile users
- Density of buildings & structure will determine the propagation & penetration losses. For example, type of cluster HDB, industrial, low private residential, antenna position, indoor loss etc



Industrial
- penetration loss range from 10 to 30dBm typically
- 50 to 400m

HDB
- penetration loss range from 20 to 30dBm typically
- 100 to 350m

Low Rise Private
- penetration loss range from 10 to 25dBm typically
- 100 to 450m

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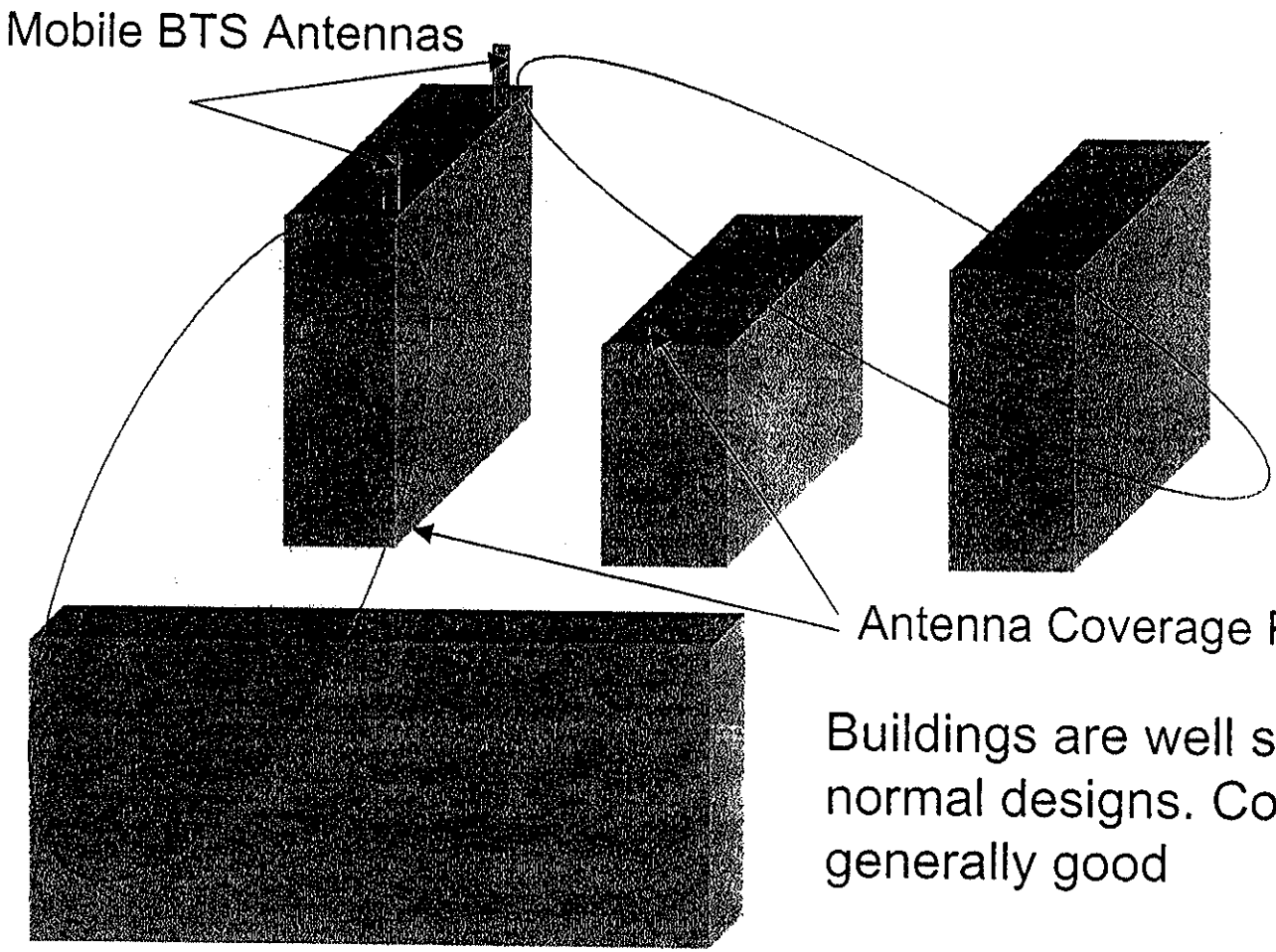
GOOD MOBILE COVERAGE



Buildings are well spaced in normal designs. Coverage is generally good

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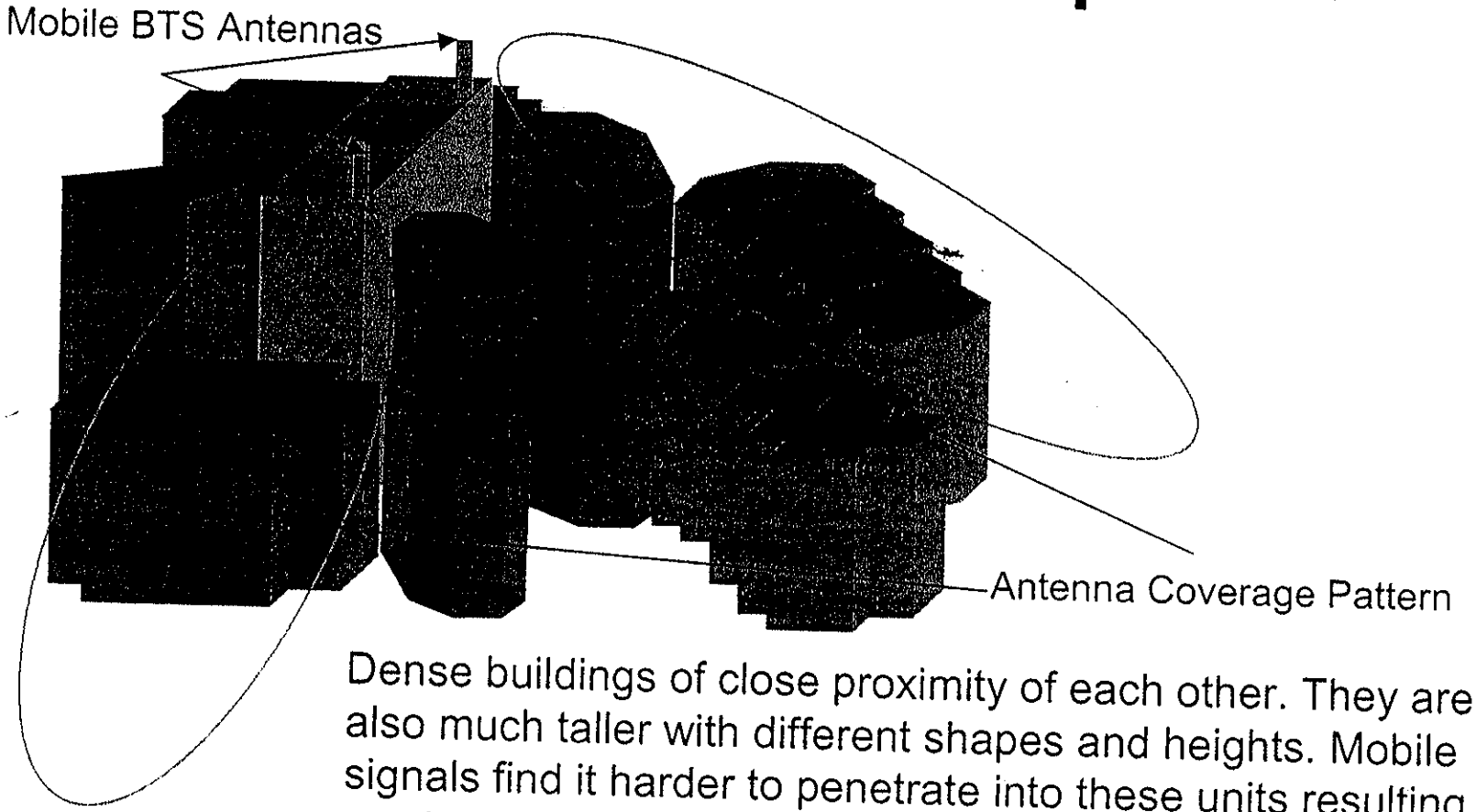
Weak Mobile Coverage In Highly Dense Residential Properties



Dense buildings of close proximity of each other. They are also much taller with different shapes and heights. Mobile signals find it harder to penetrate into these units resulting in weaker indoor coverage for the users. Lower units of the condominiums will suffer more from these weaker signals.

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Challenges in Delivering Mobile Cellular Coverage

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CHALLENGES

Increasing density of new highrise residential properties for both HDB and private resulted in weak indoor coverage.

Mainly due to:

- Uniformity in heights of the private residential properties in cluster built-up
- Close proximity of residential building blocks
- Weak coverage in basement carpark

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CHALLENGES

Securing Suitable Radio Base Station Sites in Private Residential Properties is tough for the followings :

- Pitched Roof Top
- Penthouse with roof terrace/garden
- Aesthetic physical outlook
- Low-height SP Station in low-rise residential area

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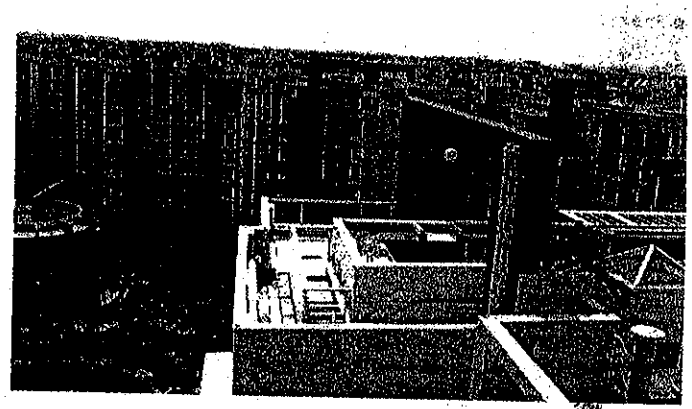
Highly Dense Private Residential









Dense High Rise Private Residential in the East

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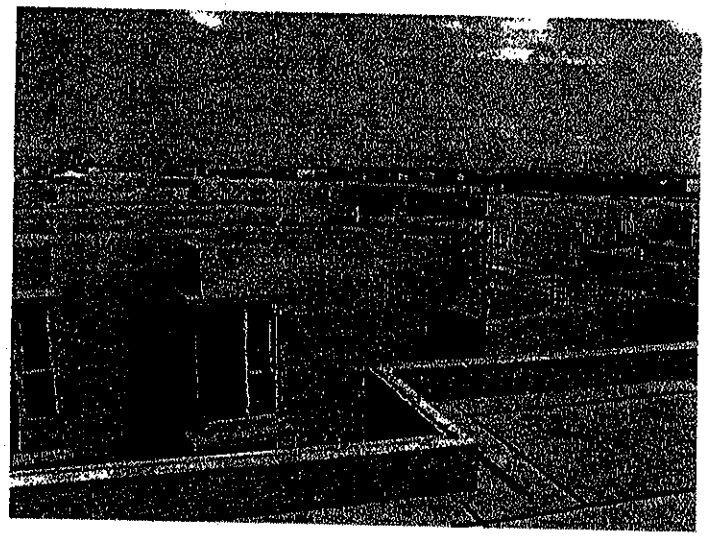
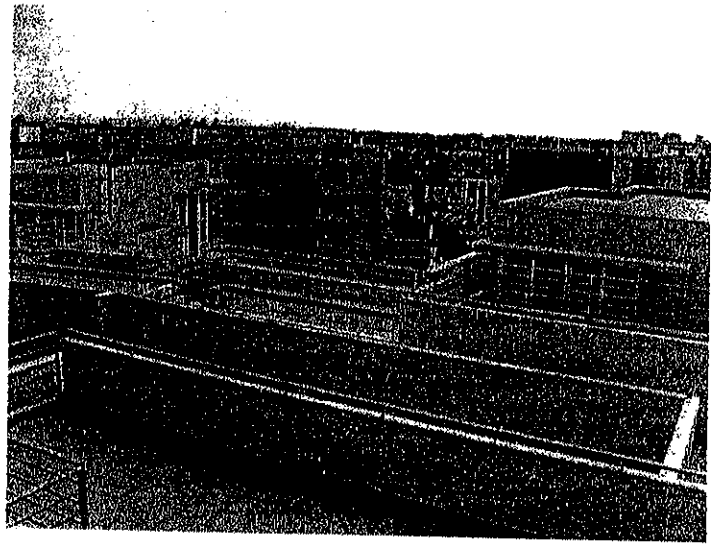
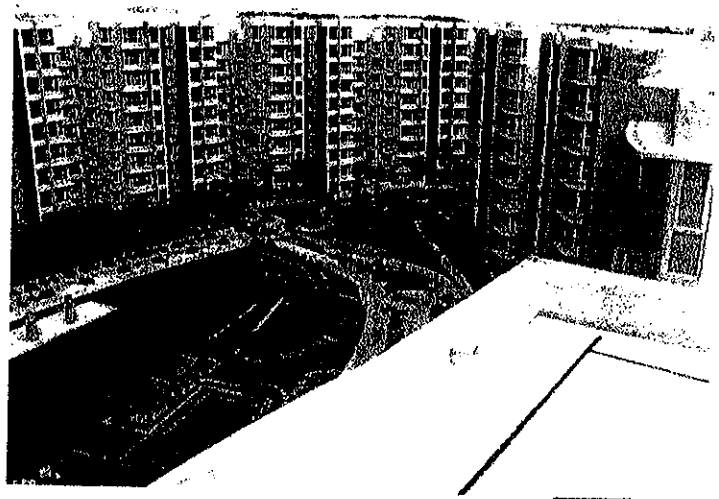
Highly Dense Private Residential









Dense High Rise Private Residential in the East

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Low Rise Private Estate





- Low-Rise Private
- Coverage Outdoor
- Challenging Sites



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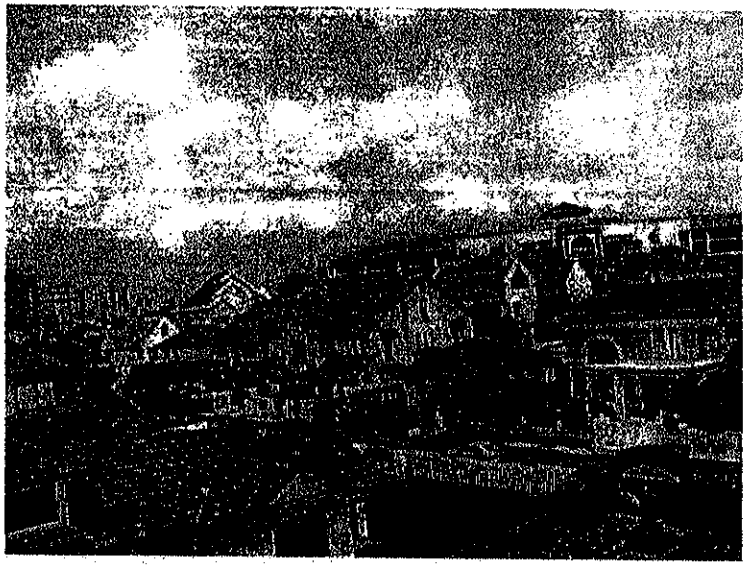
Low Rise Private Estate





- Low-Rise Private
- Coverage Outdoor
- Challenging Sites



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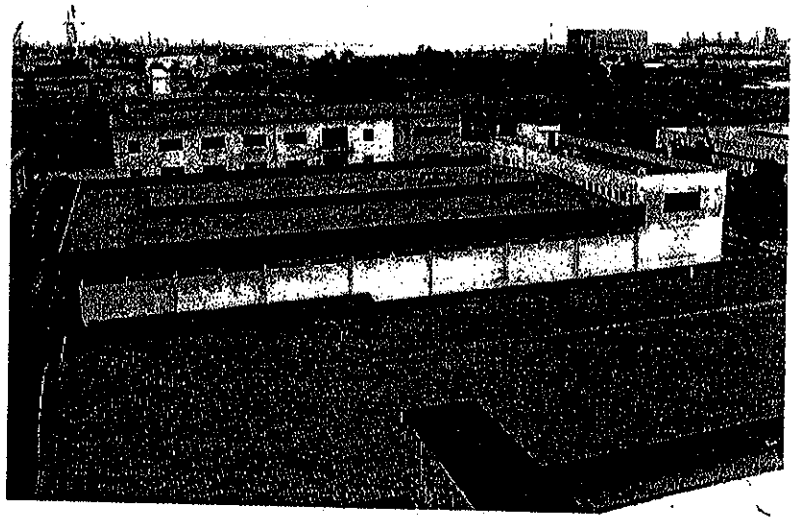
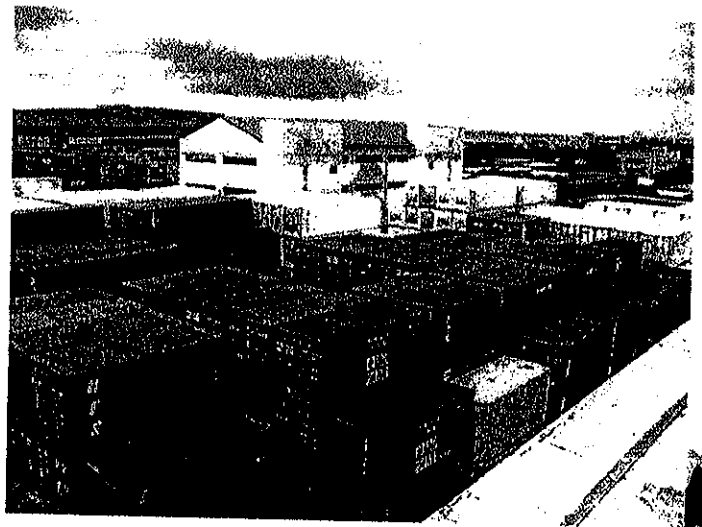
Industrial Park





- Industrial Park
- Coverage Outdoor/Indoor
- Challenging Sites



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EXAMPLE OF POSSIBLE WEAK INDOOR MOBILE COVERAGE IN DENSE NEWER CONDOMINIUMS



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EXAMPLE OF POSSIBLE WEAK INDOOR MOBILE COVERAGE IN DENSE NEWER CONDOMINIUMS



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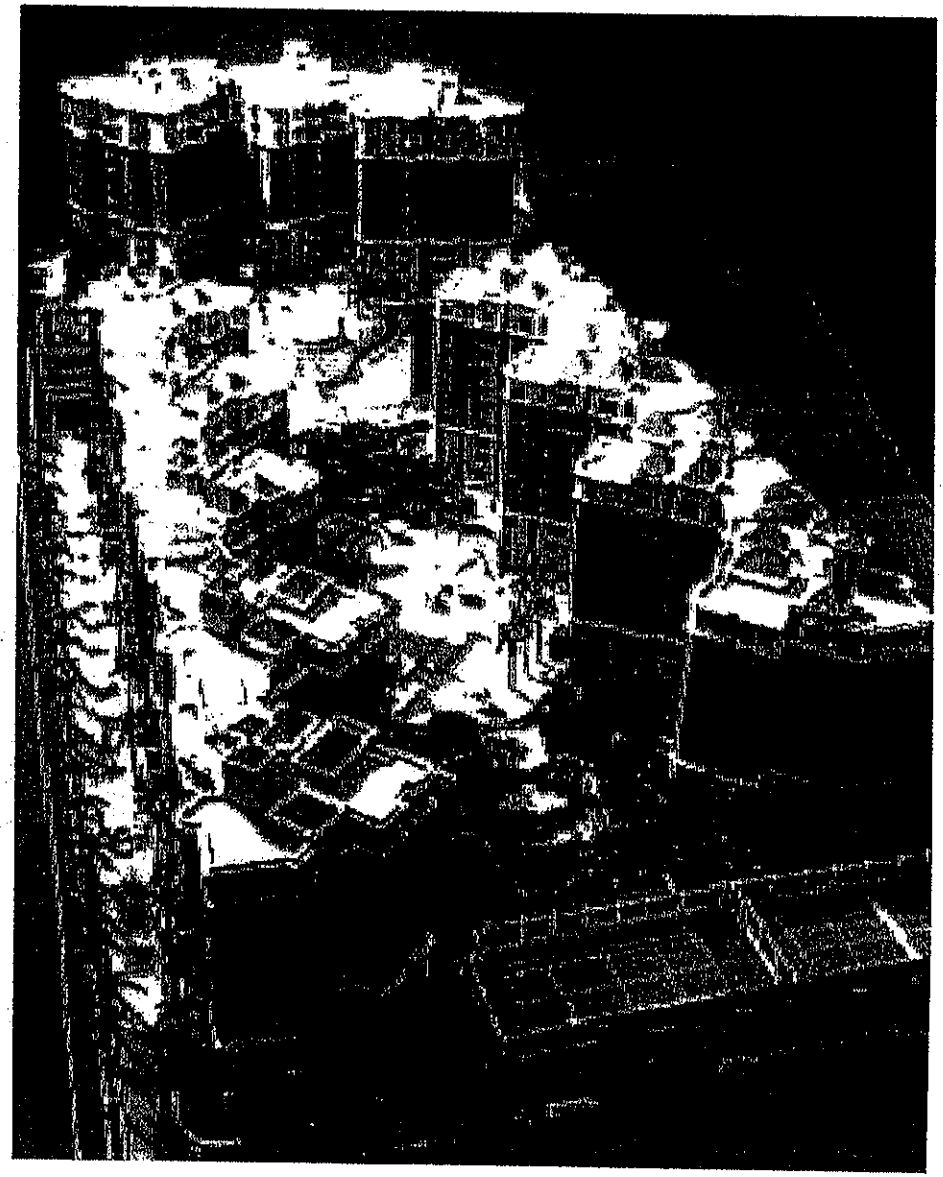
EXAMPLE OF POSSIBLE WEAK INDOOR MOBILE COVERAGE IN DENSE NEWER CONDOMINIUMS



StarHub

Typical Issues In New Condominium

PITCH ROOF DESIGN

- New condominiums with Pitch Roof designs
- Such designs make it almost impossible for mobile operators to install mobile antennas in the condominium premises
- Indoor coverage inside condominium units affected

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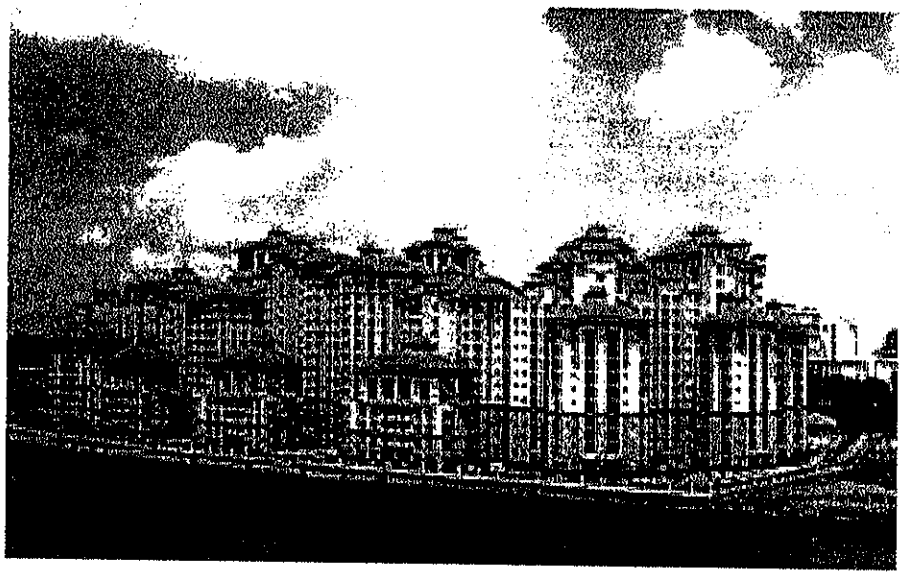
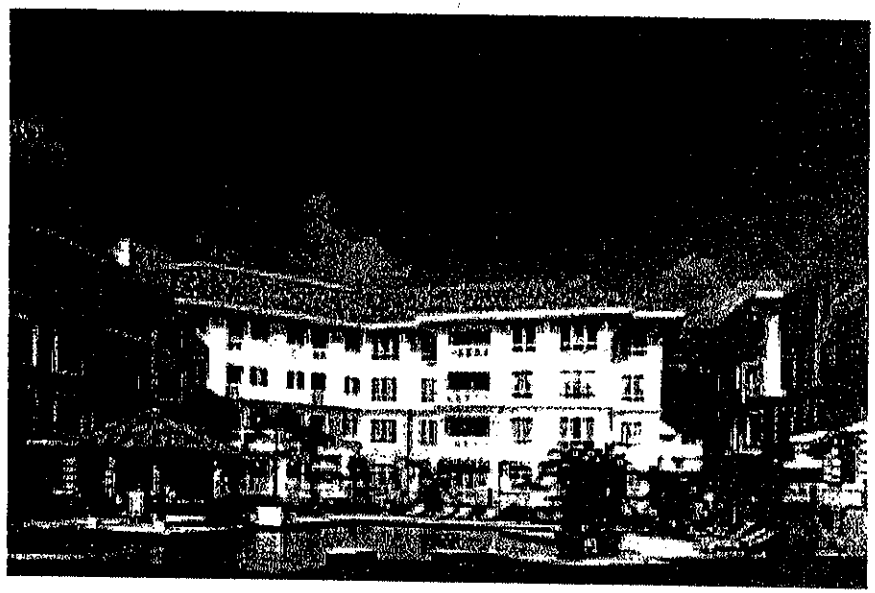
PITCH ROOF DESIGN CONDOMINIUMS





*Densely built Pitch Roof designed condominiums tend to have weaker indoor coverage as signals encounter difficulties in penetrating into the units. Antennas will also be more difficult to install in such locations, due to its unique aesthetic designs

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Typical Issues In New Condominium

PENTHOUSES

- Modern condominiums usually comes with Penthouses
- Condominium Committees usually do not allow mobile antennas to be installed at these residences' premises.

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NEWER CONDOMINIUMS WITH ROOF TOP PENTHOUSES





*The highest floor of each block of the condominium are usually penthouses or Duplex units and it is usually impossible to mount antennas and equipment on the top of the block

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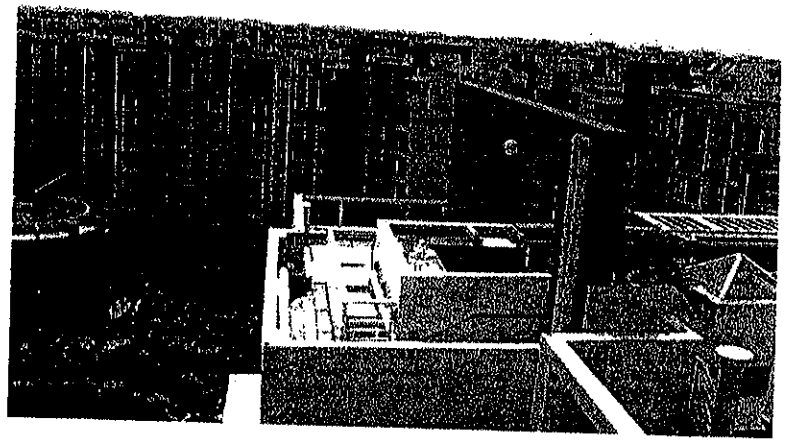
Typical Issues In New Condominium

Uniformity of Height in Condominium

Very uniform in height translates to weak indoor coverage. RF signal encounters more resistance resulting in weak signal for the apartment unit.





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Possible Way Forward

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Possible Way Forward

Increasing Density of Mobile Base Station in the Private Residential Area

- More Power. Only increasing the number of mobile base station installations is the solution, to better enhance the indoor coverage of these dense highrise private residential area

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Possible Way Forward

How about the constraints faced in securing sites in private residential?

- Developers can help to provide a more wireless base station installation friendly property

What wireless operators need?

- More Space on the roof. Without impacting too much on the building outlook, at least 5x5x5 meter cube space above the lift motor room or restricted open space which is located preferably the highest point on the building with accessibility to telecom riser and utility.

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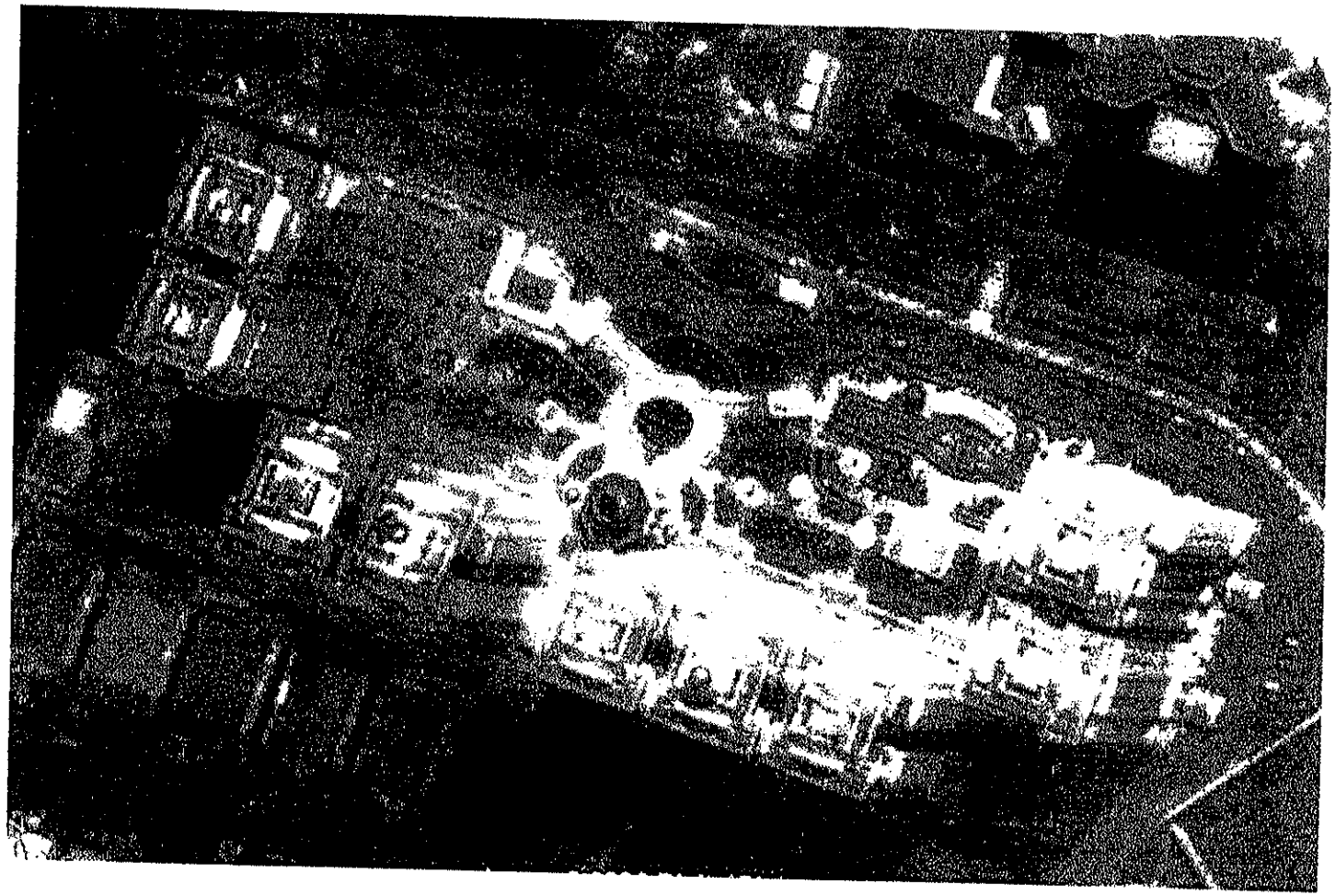
EXAMPLE OF A MODERN CONDOMINIUM THAT IS LIKELY TO BE MOBILE SIGNALS FREINDLY



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Other Issues
Coverage in Basement Carparks

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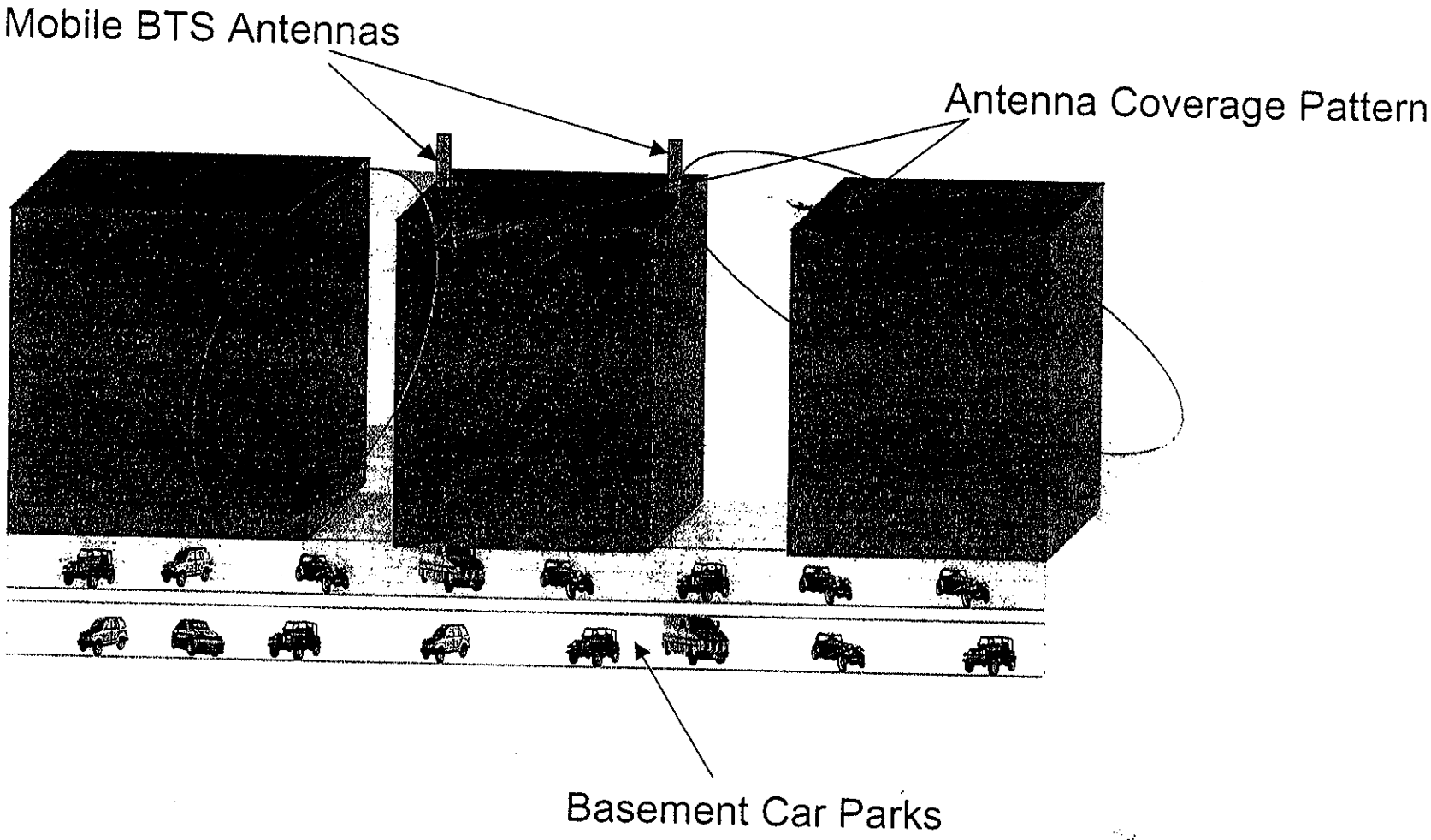
POOR MOBILE COVERAGE IN NEWER CONDOMINIUMS WITH BASEMENT CARPARKS



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POOR MOBILE COVERAGE IN NEWER CONDOMINIUMS WITH BASEMENTS CARPARKS

PROBLEM

- Mobile signals cannot penetrate into basements levels. There will be coverage problems in basements.
- Only way to provide coverage to these areas is to install dedicated base stations or repeaters.

SOLUTIONS

- If there is more than 1 basement levels, B1 could be build in a way such that there are "Gaps" along the perimeter of the car park.
- Mobile signals can propagate through these gaps and provide some coverage in B1.

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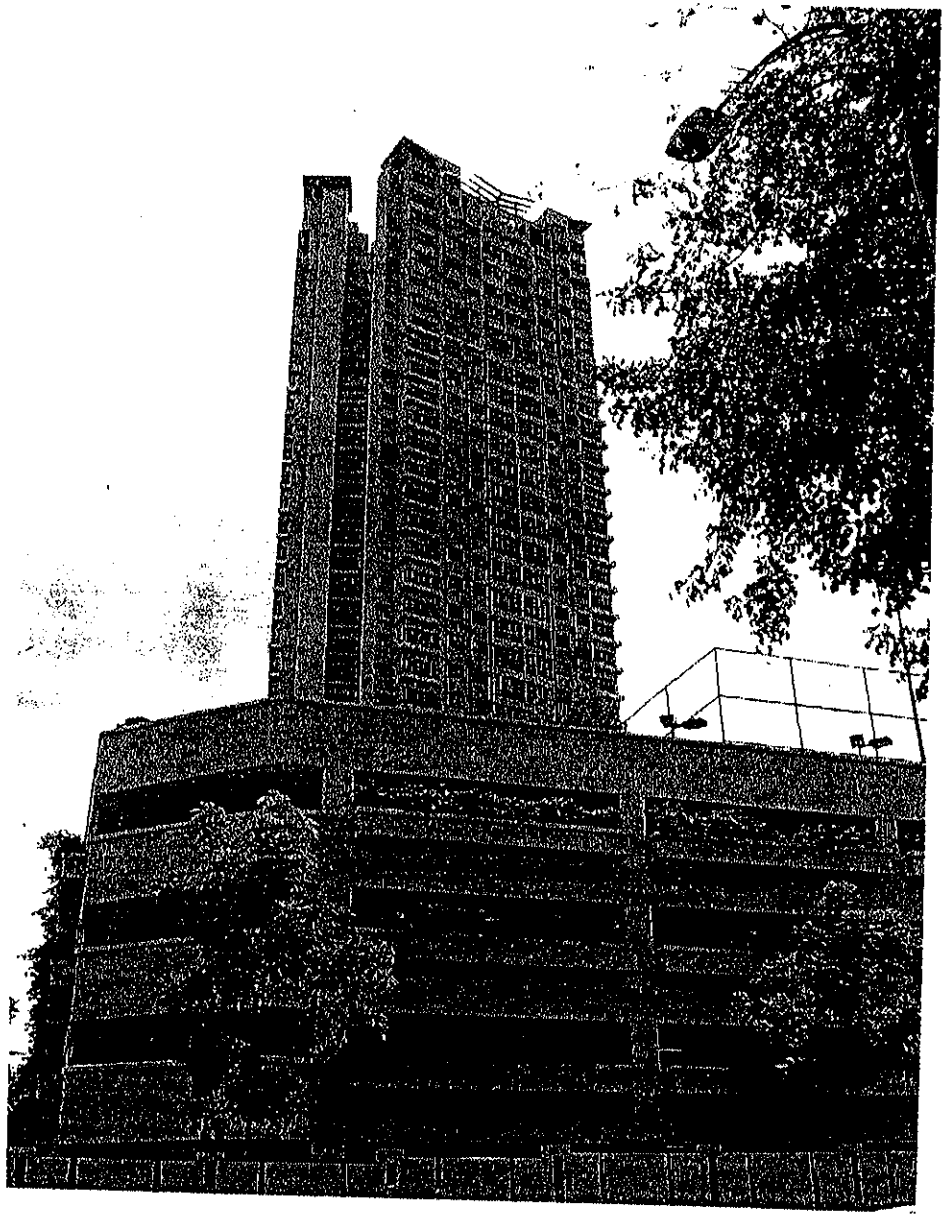

- Photo on the left shows a modern condominium with a Multi Storey Car Park cum Tennis Courts (on top of car park) instead of a Basement Car Park.

- Residents will be able to receive mobile phone signals in the car park areas as compared to condominiums with basements car parks.

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Other Issues
Coverage in Low-Rise Private Residential

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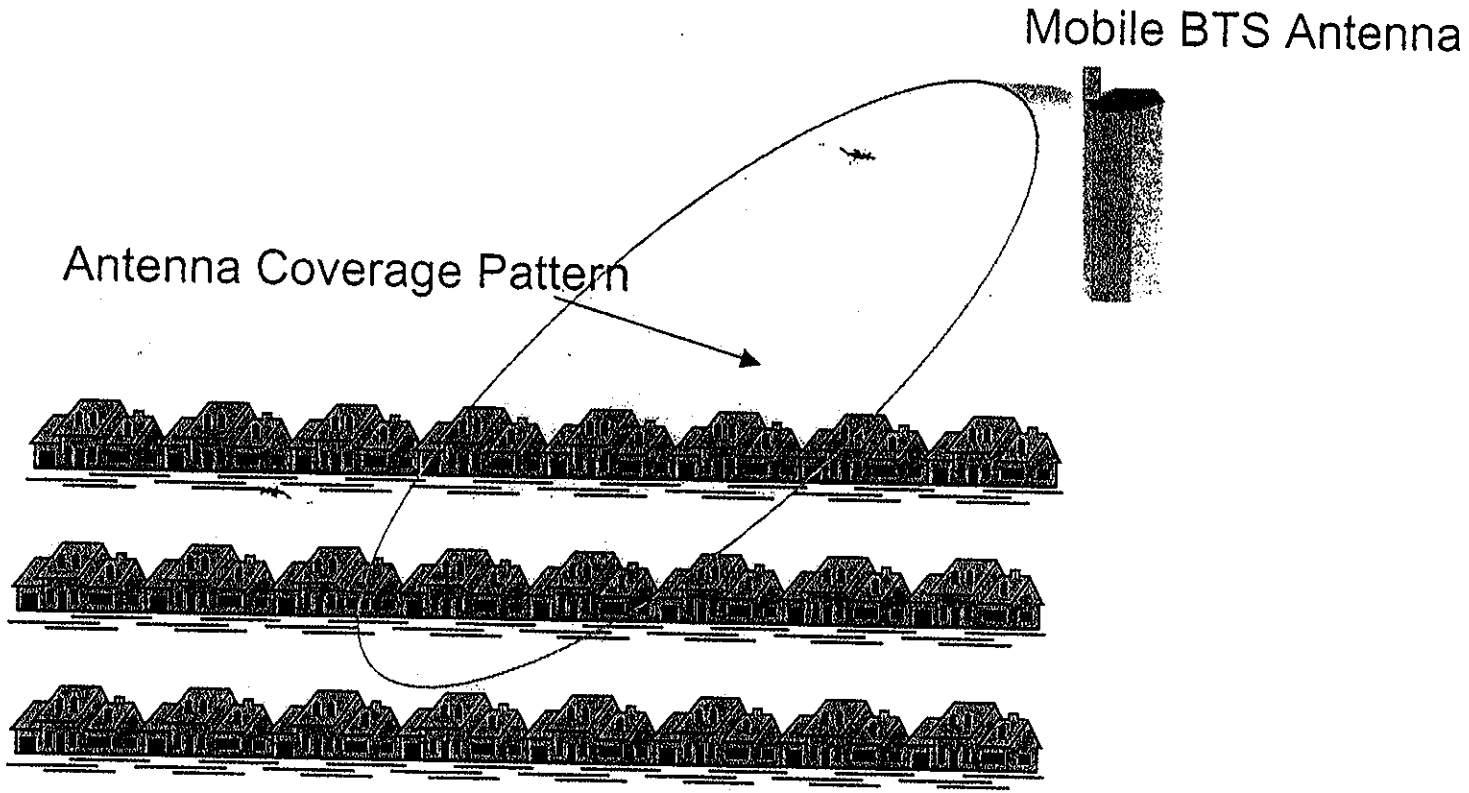
POOR MOBILE COVERAGE IN MODERN CLUSTER TERRACE HOUSES



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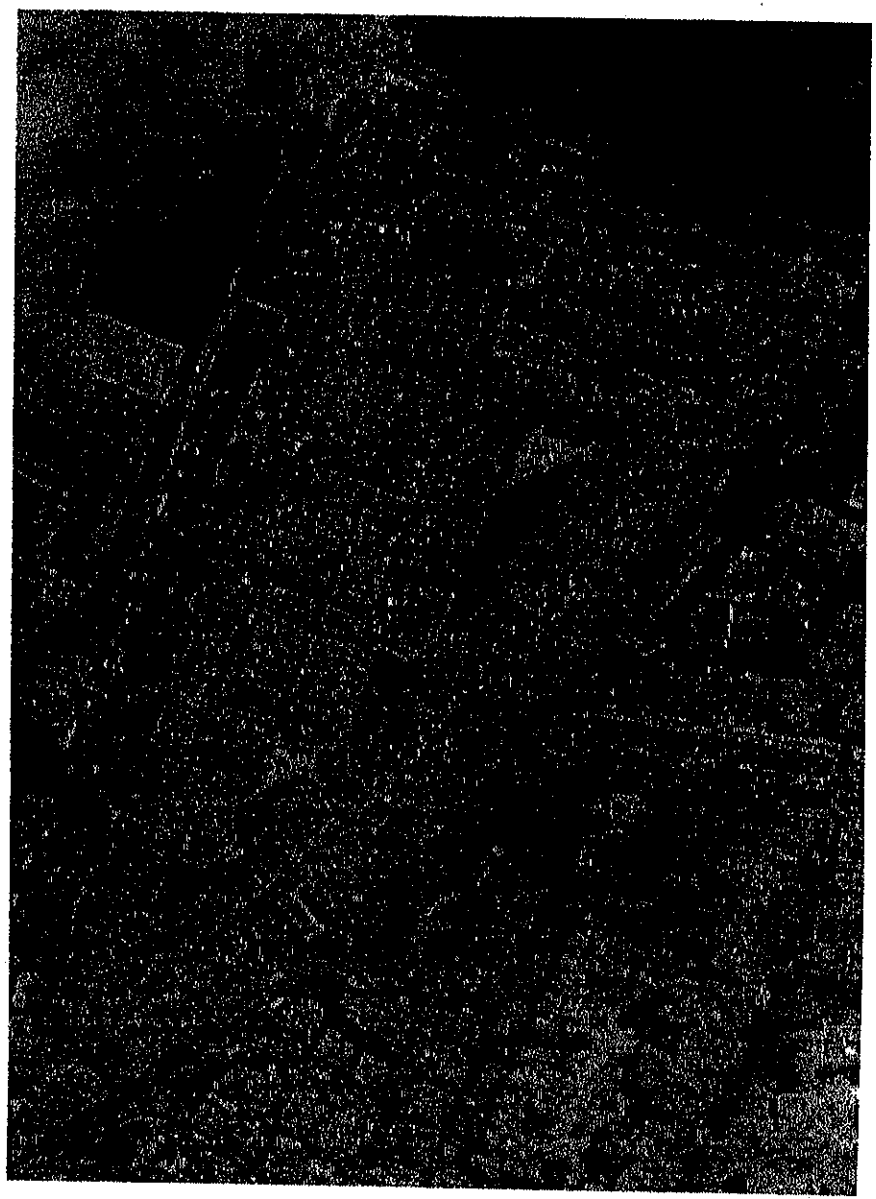
EXAMPLE OF MODERN CLUSTER TERRACE HOUSES



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MODERN TERRACE HOUSE THAT MAKE USE OF GLASSES IN THE DESIGN

- Modern day cluster terraces are densely built. Depending on the location of the mobile base stations, coverage inside the houses may suffer.
- Designs that use a lot of glass materials for the houses will largely help mobile signals to penetrate indoors. The slide below show an example of a modern terrace house that make use of UV-protect glass in its design.



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End

Thank You

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StarHub Seminar

Commercial Packages - Consumer

by

Tony Yap

28th April 2006

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STARHUB COMMERCIAL PACKAGES FOR CONSUMER MARKETS

- Overview of StarHub Services – Consumer Markets
- Cable Network Infrastructure
- StarHub 3 services
  1. Digital Cable
  2. MaxOnline
  3. StarHub Mobile

- StarHub Services – Business Customers

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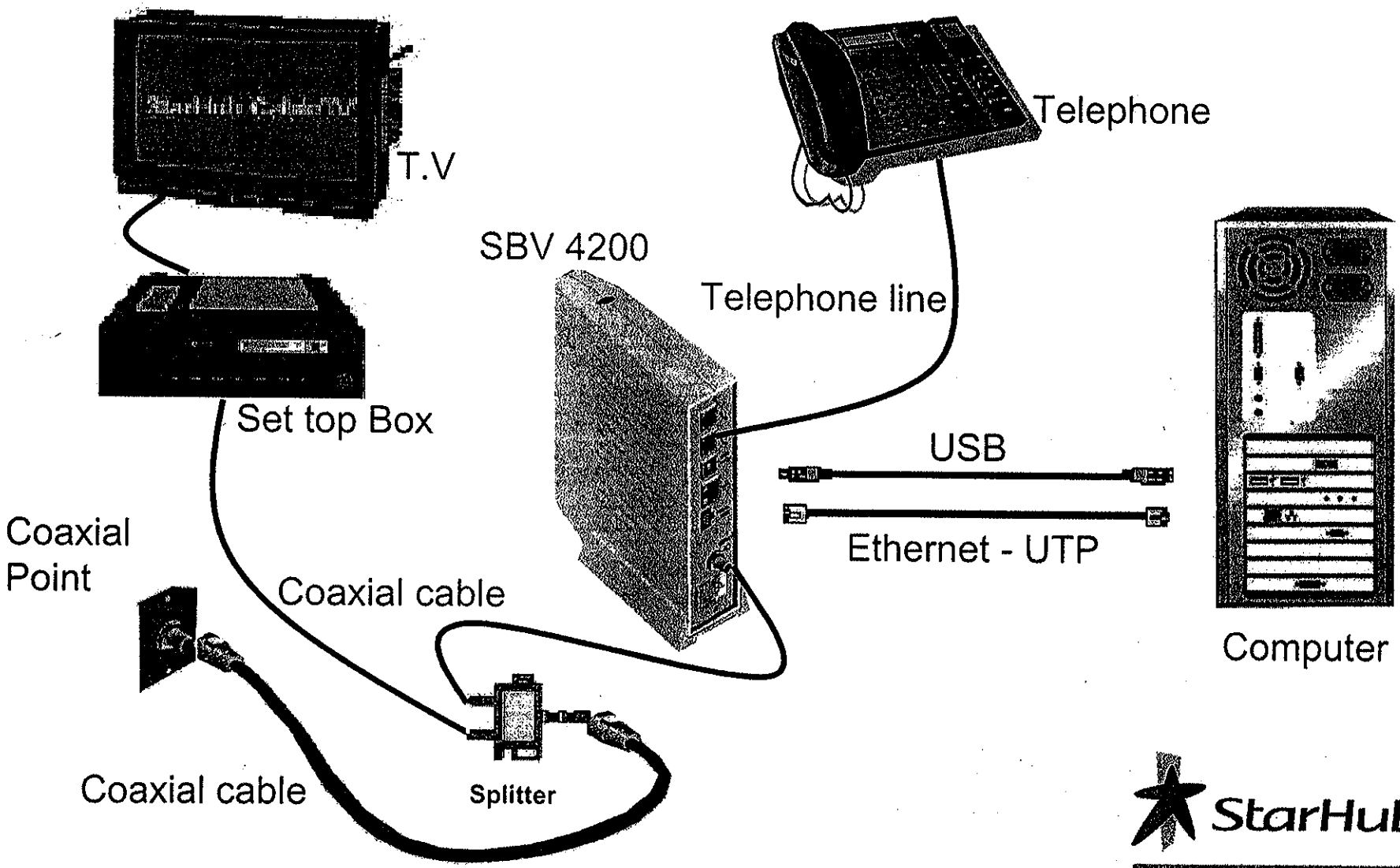
STARHUB COMMERCIAL PACKAGES FOR CONSUMER MARKETS - OVERVIEW



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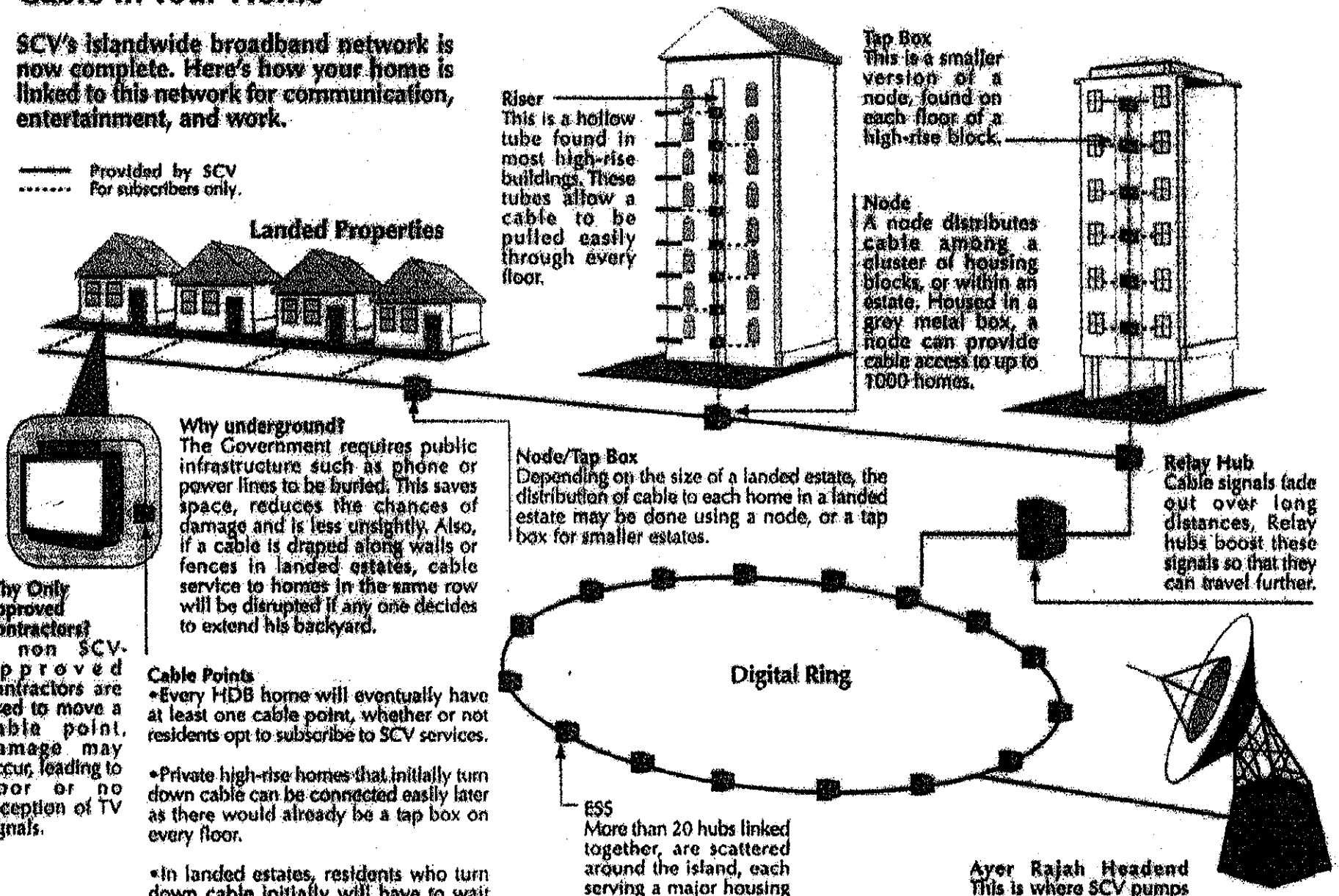
Cable In Your Home

SCV's islandwide broadband network is now complete. Here's how your home is linked to this network for communication, entertainment, and work.

——— Provided by SCV
------- For subscribers only.



Riser
This is a hollow tube found in most high-rise buildings. These tubes allow a cable to be pulled easily through every floor.

Tap Box
This is a smaller version of a node, found on each floor of a high-rise block.

Node
A node distributes cable among a cluster of housing blocks, or within an estate. Housed in a grey metal box, a node can provide cable access to up to 1000 homes.

Why underground?
The Government requires public infrastructure such as phone or power lines to be buried. This saves space, reduces the chances of damage and is less unsightly. Also, if a cable is draped along walls or fences in landed estates, cable service to homes in the same row will be disrupted if any one decides to extend his backyard.

Node/Tap Box
Depending on the size of a landed estate, the distribution of cable to each home in a landed estate may be done using a node, or a tap box for smaller estates.

Relay Hub
Cable signals fade out over long distances, Relay hubs boost these signals so that they can travel further.

Why Only Approved Contractors?
If non SCV-approved contractors are used to move a cable point, damage may occur, leading to poor or no reception of TV signals.

Cable Points
- Every HDB home will eventually have at least one cable point, whether or not residents opt to subscribe to SCV services.
- Private high-rise homes that initially turn down cable can be connected easily later as there would already be a tap box on every floor.
- In landed estates, residents who turn down cable initially will have to wait longer if they change their minds. This is because SCV contractors need to start digging again to link the home with the nearest node.

ESS
More than 20 hubs linked together, are scattered around the island, each serving a major housing estate. From here, cables branch off to nodes in individual blocks or landed estates.

Ayer Rajah Headend
This is where SCV pumps in its programmes received via satellite or video to homes across the island.

RESIDENTIAL CONNECTIVITY TO STARHUB CABLE NETWORK – LANDED HOMES

Semi-Detached & Terrace Houses

PLAN 1: Landed Connection
Sign up to our 24-month interest-free instalment plan at just $98 ($102.90 w/GST) a month and enjoy complimentary subscription to StarHub Digital Cable* OR MaxOnline!

PLAN 2: Subscription Commitment
Subscribe to StarHub Digital Cable and/or MaxOnline with a minimum monthly subscription of $50 ($52.50 w/GST) for 5 years and enjoy complimentary connection to StarHub's broadband network

*Complimentary 24-month subscription to StarHub Digital Cable worth up to $62 ($65.10 w/GST) per month or MaxOnline 2000 worth $56 ($58.80w/GST) per month.

Exclusive Bungalows

PLAN 1: Landed Connection
Sign up to our 24-month interest-free instalment plan at just $248 ($260.40 w/GST) a month and enjoy complimentary subscription to StarHub Digital Cable* AND MaxOnline!

PLAN 2: Subscription Commitment
Subscribe to StarHub Digital Cable and/or MaxOnline with a minimum monthly subscription of $120 ($126 w/GST) for 5 years and enjoy complimentary connection to StarHub's broadband network!

*Complimentary 24-month subscription to StarHub Digital Cable worth up to $62 ($65.10 w/GST) per month or MaxOnline 2000 worth $56 ($58.80w/GST) per month.

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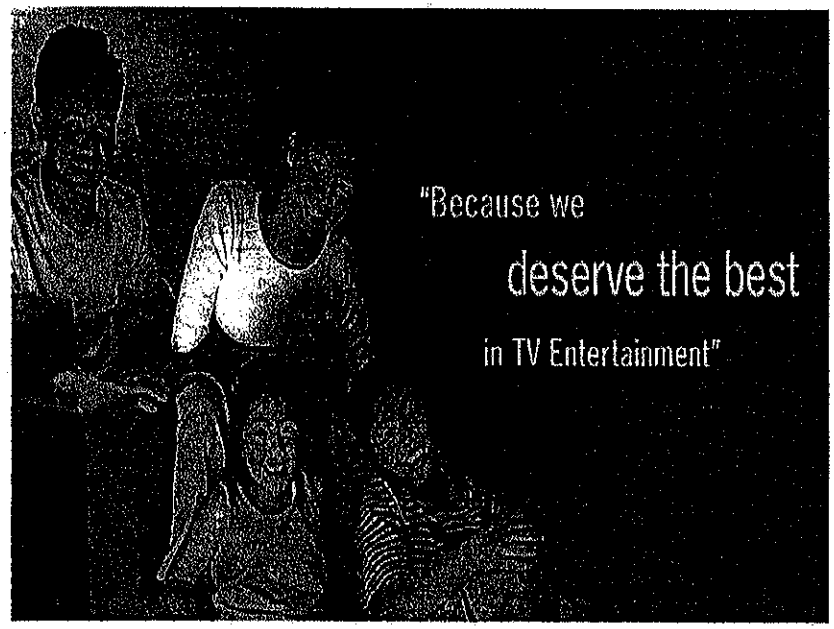
STARHUB COMMERCIAL PACKAGES FOR CONSUMER MARKETS – DIGITAL CABLE



StarHub Digital Cable.
Because You Deserve It.

- From as low as $24 ($25.20 w/GST) per month
- Comprises of 41 Analogue channels and 42 Digital Channels and growing
- 6 Value Packs to cater to different viewing needs starting from $38 ($39.90 w/GST) per month
- FREE use of first digital set-top box with any Value Pack signup.

For more information on StarHub residential services, please visit our website at www.starhub.com or 1630

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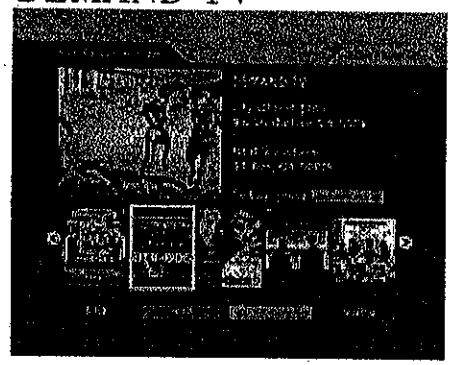
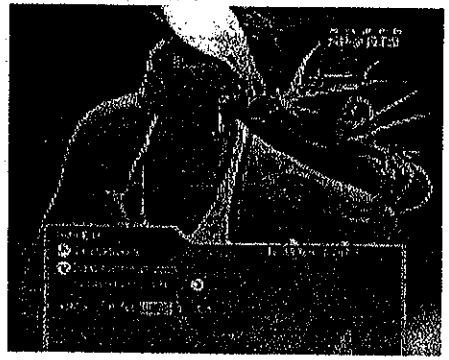
STARHUB COMMERCIAL PACKAGES FOR CONSUMER MARKETS – DIGITAL CABLE

DEMAND TV



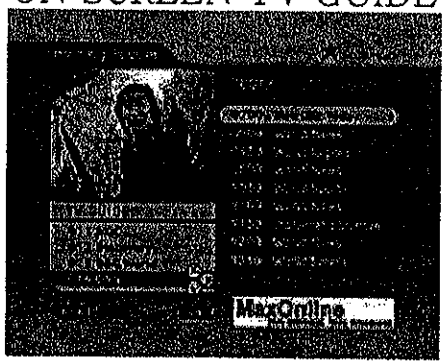
INFO BAR



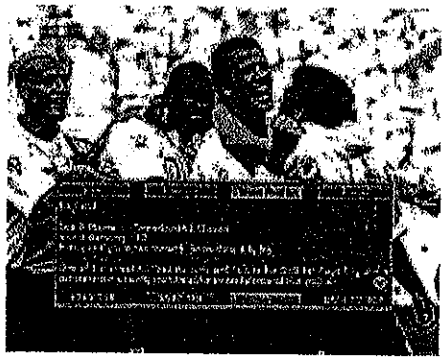
StarHub Digital Cable.
Because You Deserve It.

• Features of Digital Set-top box
More Control. More Interactivity. More Choice.

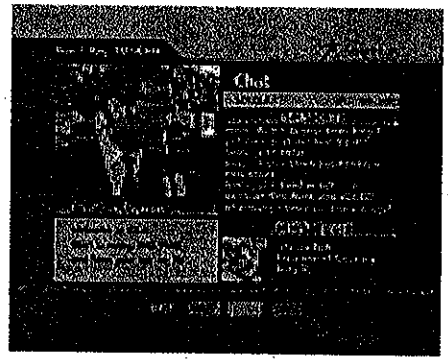
ON SCREEN TV GUIDE



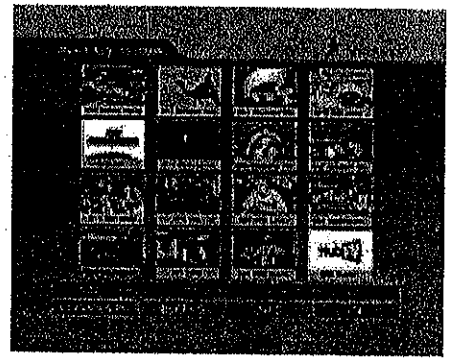
eTV



CHAT



VIDEO MOSAIC



For more information on StarHub residential services, please visit our website at www.starhub.com or 1630

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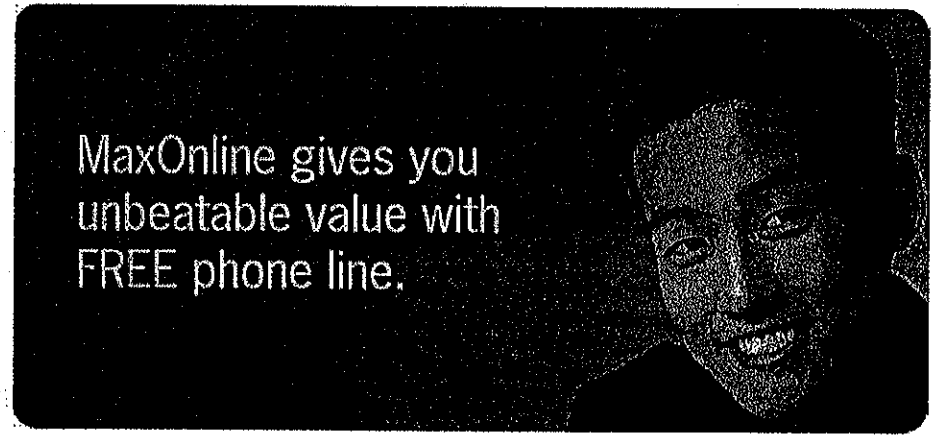
STARHUB COMMERCIAL PACKAGES FOR CONSUMER MARKETS - MAXONLINE

MaxOnline service and the price at a glance!

Features	MaxOnline Ultimate	MaxOnline 6500	MaxOnline 2000
Unlimited broadband access fee	$121.80 (w/GST) per month	$79.80 (w/GST) per month	$58.80 (w/GST) per month
Download speeds	Up to 30Mbps (30,000Kbps) Singapore's highest residential download speed	Up to 6.5Mbps (6,500Kbps)	Up to 2Mbps (2,000Kbps)
Upload Speeds	Up to 1Mbps (1,000Kbps)	Up to 384Kbps	Up to 256Kbps
Digital Voice	FREE	FREE	FREE
i.View - 6 cable TV channels via your MaxOnline connection	FREE	$8.40 (w/GST) per month	$8.40 (w/GST) per month



First, MaxOnline connects you to the best broadband experience at the highest download speeds of up to 30Mbps (30,000Kbps). Now, we are bringing you close to your loved ones with Digital Voice. Enjoy FREE local calls+ on Digital Voice Home, our digital quality residential phone service. Or stay in touch, anywhere in the world with unlimited overseas calls on our portable phone service, Digital Voice Travel.

With the highest download speeds, MaxOnline is also the ideal broadband connection for home networking, letting your whole family go online at the same time and enjoy more at once.

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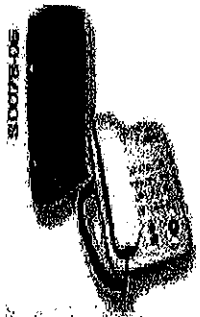
STARHUB COMMERCIAL PACKAGES FOR CONSUMER MARKETS - MAXONLINE

Now, MaxOnline gives you a choice of Digital Voice Home or Digital Voice Travel to stay in touch with your loved ones.

√ Ideal for Home Networking
√ 'Always On'
√ 24-Hour technical Support
√ Plug And Play
√ No user name & password required

MaxOnline gives you even more value with FREE Digital Voice Home or Digital Voice Travel

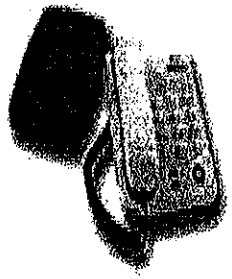
Digital Voice HOME



A residential phone service with free local calls+.

Plus, MaxOnline customers can purchase the voice-enabled cable modem at a special price of just $115.50 (w/GST).

Digital Voice TRAVEL



A portable phone service that connects you anywhere in the world with unlimited overseas call#.

Plus, MaxOnline customers can purchase the Integrated access device at a special price of just $93.45 (w/GST).

Free Digital Voice is valid till 31 December 2007. An activation fee of $42 (w/GST) is chargeable. +Valid till 31 December 2007. #Valid for calls made between Digital Voice Travel lines through StarHub-approved IADs only. Terms and Conditions apply.

Digital Voice TRAVEL



Portable phone service to stay connected anywhere in the world!

- **Unlimited Overseas Calls***
- **FREE+ Local Calls**
- **Portability**
- **One Number For Life**
- **Exclusive IDD Savings**

Enjoy a residential phone service with a host of benefits!

- **FREE Local Calls***
- **Up To 200 minutes of FREE* IDD 018 Talktime.**
- **One Number For Life**
- **Exclusive IDD Savings**

Digital Voice HOME



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STARHUB COMMERCIAL PACKAGES FOR CONSUMER MARKETS - MOBILE



Exclusive benefits from StarHub Mobile

Free Incoming Calls – First and only service provider to offer you Free Incoming Calls across all plans, so you'll save with any plan you choose.
Per Second Billing – You pay exactly for what you use and not a second more.
Free IDD 018 to 13 destinations – Save with Free IDD018 for calls to Brunei, Canada, China, Hong Kong, Laos, Macau, Malaysia, Puerto Rico, Russia, South Korea, Taiwan, Thailand, USA (states in USA only, including Alaska and Hawaii).
Airtime Rollover – Enjoy maximum value for your money when you carry over any unused airtime to the next month.
Convert Free SMS to Free MMS – Enjoy flexibility and use your free SMS to send out free MMS.
Free 100 SMS with GIRO – Simply pay your bill by GIRO and get 100 more free SMS.

Free Video Streaming – Enjoy free video contents from up-to-date sports coverage, "LIVE" news, to the best entertainment with music, comedy or the latest Hollywood buzz on your mobile phone. You'll never experience a dull moment again even when you're away from home!

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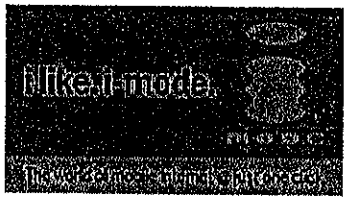
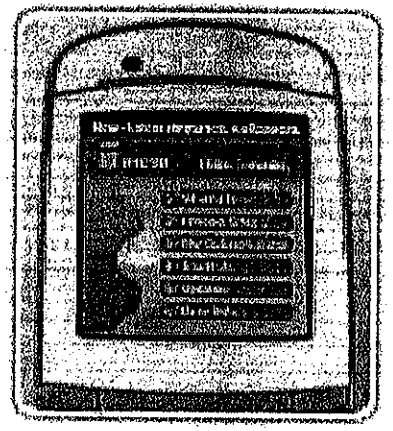
STARHUB COMMERCIAL PACKAGES FOR CONSUMER MARKETS - MOBILE

Welcome to i-mode® - a new world of mobile internet





Brought to your exclusively by StarHub Mobile, i-mode® is a true mobile data service that is designed to help consumers get so much more out of a mobile phone.

Just one click and you're connected to an exciting mobile Internet world of exciting lifestyle content sites and services. Besides offering you a wide variety of content sites, i-mode® also let you shop, trade stocks, do your banking transactions (handset dependent), manage emails, play games and do so much more on your mobile phone.

What's more, unlike other mobile data services, sites are designed for faster access and downloading, giving you the best user experience ever on a mobile phone.

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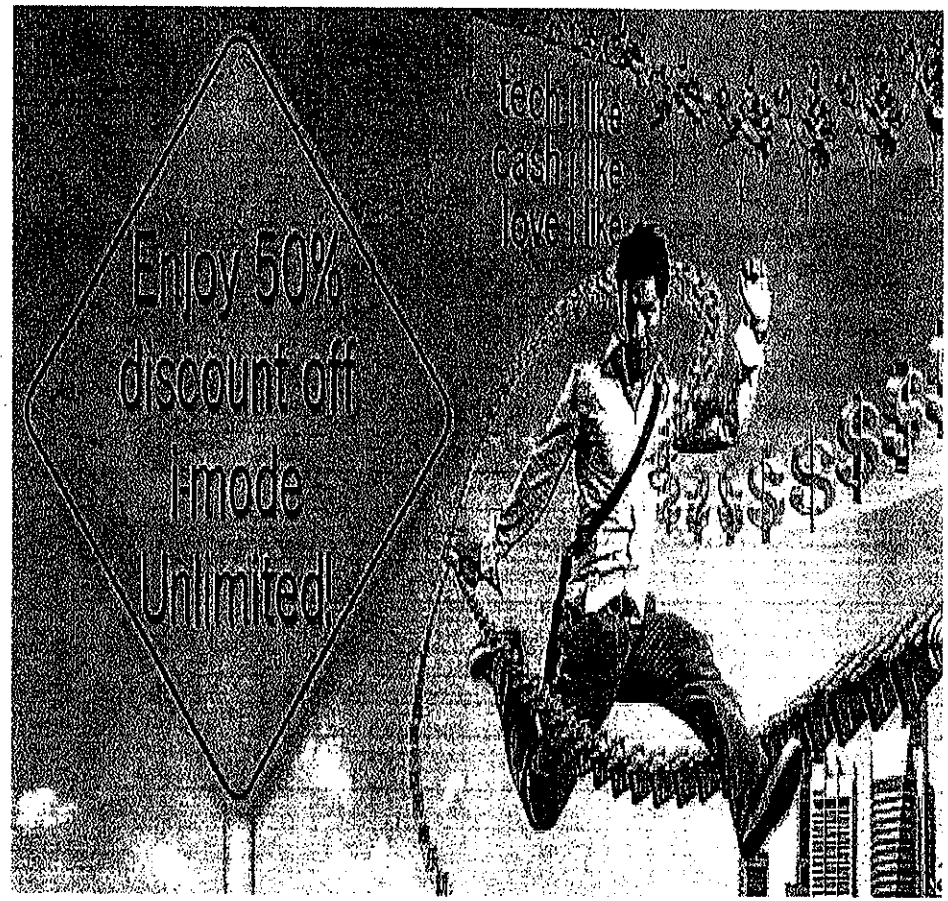
STARHUB COMMERCIAL PACKAGES FOR CONSUMER MARKETS - MOBILE

Welcome to i-mode® - a new world of mobile internet



i-mode works on both 2G and 3G networks. To access, you'll need an i-mode mobile phone and one of the following great value data plans from StarHub Mobile.

Data Plans	Gee! Lite	Gee! Value#	i-mode Unlimited
Subscription	Pay as you use	$5.25^ (U.P. $10.50)	[redacted] (U.P. $21)
Free bundled data	N.A.	$20	Unlimited (i-mode data usage)
Excess charges for Gee! & Internet	1.05 ¢/kb	0.32 ¢/kb	0.32 ¢/kb*
One-time Registration Fee*~	N.A.	FREE (U.P. $10.50)	FREE (U.P. $10.50)

Note: All prices inclusive of GST.

Available for subscription as a Value-added Service (on top of a voice plan) or a datapack.
^ Promotional price for Gee! Value until 30 Apr 2006.
* For Gee! access on non i-mode mobile phones.
~ One-time registration fee for the above plans, if applicable, will be waived until 31 Dec 2006.
~ 50% off i-mode Unlimited is valid till 30 Apr 2006.

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STARHUB COMMERCIAL PACKAGES FOR BUSINESS CUSTOMERS

For more information on StarHub Business solutions and services:

- Visit our website at http://www.starhub.com/business/

- Call StarHub Business Hotline at 1800-888 8888
  Mondays – Fridays, 8.30am - 6pm (excluding public holidays)

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End of Presentation

THANK YOU !!

StarHub

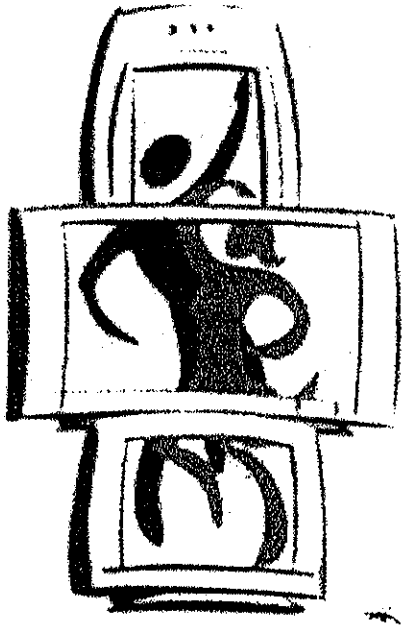
StarHub Seminar

Commercial Packages - Corporate
by
Stephen Tan

28th April 2006

StarHub

Convergence is here!



Celebrate the
future
of Hubbing









StarHub

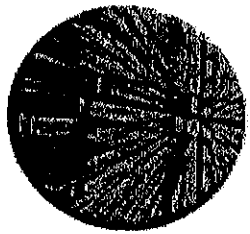
What we offer

Business Solutions and Services

We have the widest range of
Business Solutions And Services to offer



IP/Internet



Data



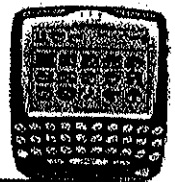
Mobile



IDD



Managed Services
(FM, Arcstar,
BT)



Mobility Solutions
(Wireless broadband,
Wireless Mail&
Messaging)



Information and
Entertainment
Solutions
(Cable TV, In-room
broadband, etc.)

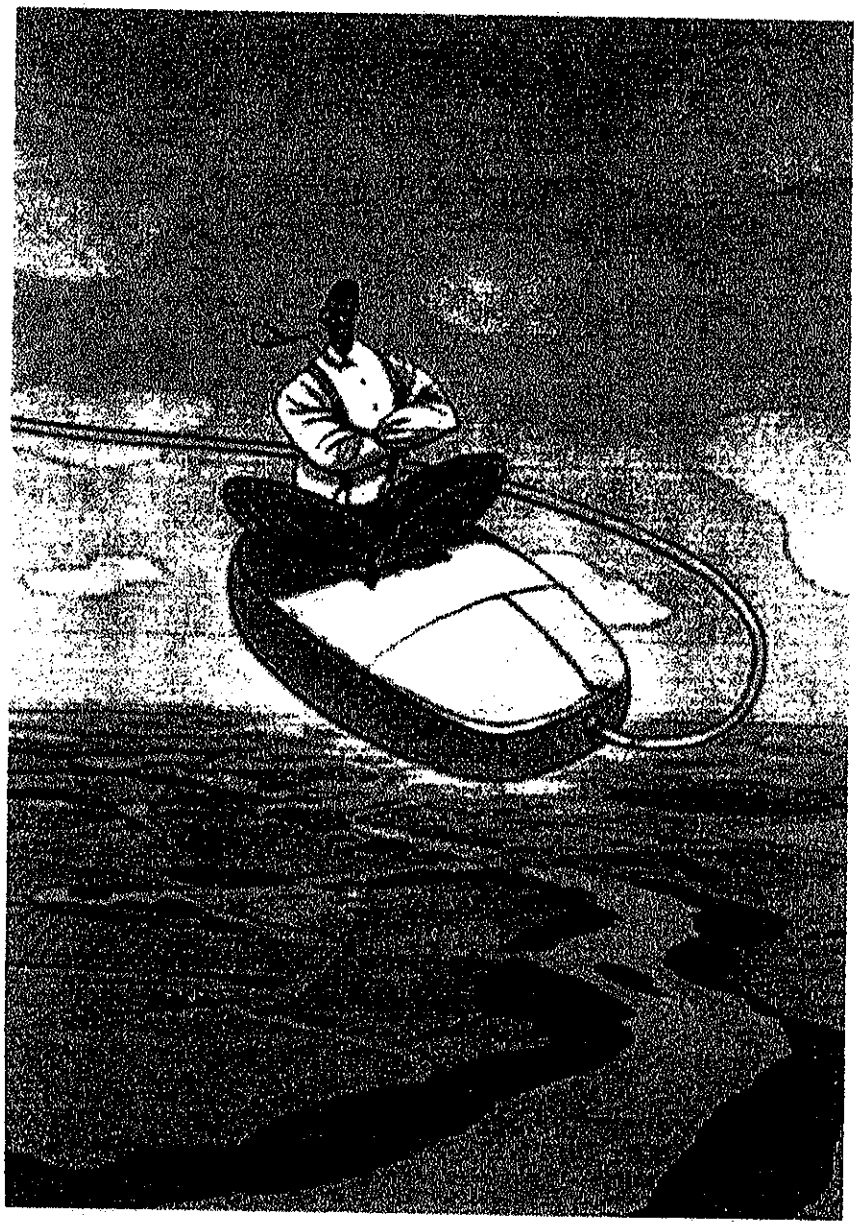


Click on any of the icons for more details

StarHub

What we offer

IP/Internet Services



- Offers a full suite of communication solutions that are powerful and cost-effective via our reliable facilities and network
- Our IP/Internet Services include:

>Internet Leased Line

>StarBiz (Hosted Intranet)

>ADSL WebSpeed

>Corporate Dial-up

>IP.Q

>StarHub IP Exchange

>MaxOnline

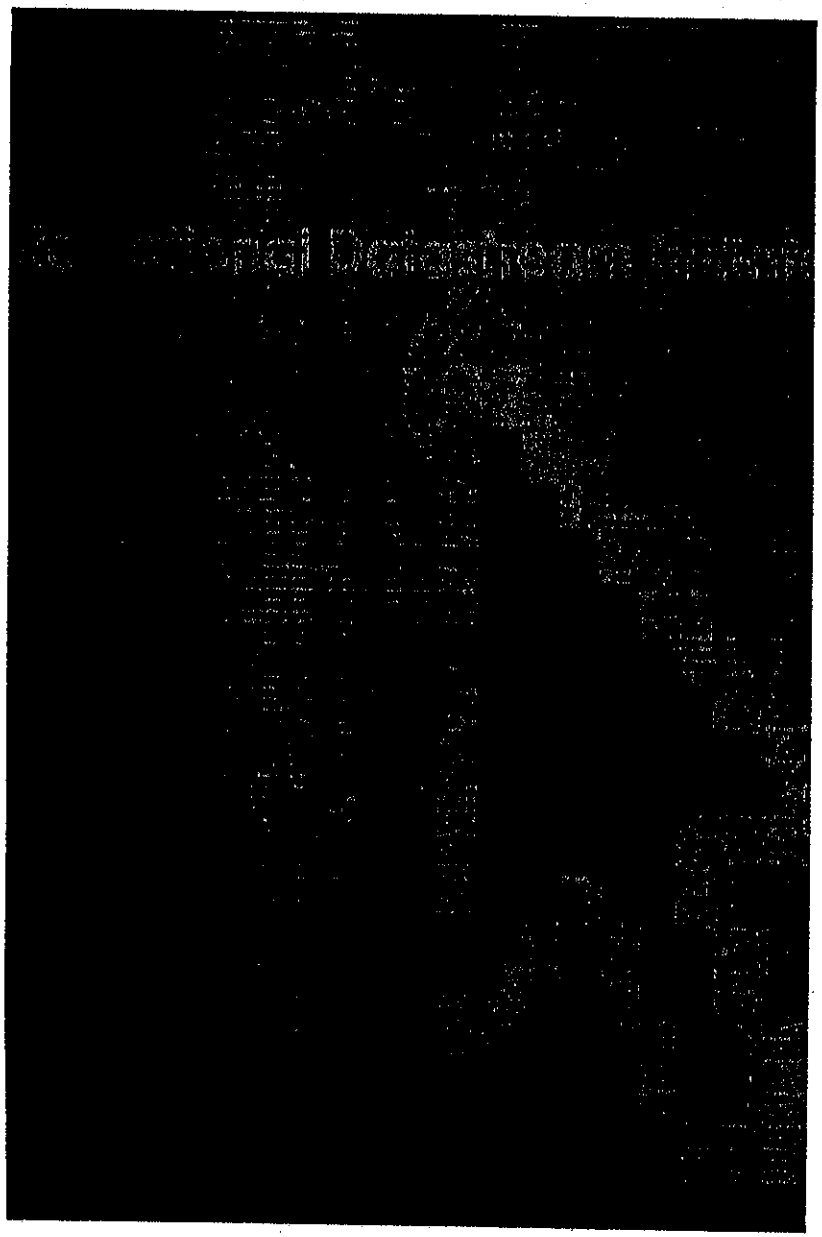
>Wireless broadband

>Co-Location Service

StarHub

What we offer

Data Services



- Offers a full suite of data communication solutions that are powerful and cost-effective via our reliable facilities and network

- Our Data Services include:

  - International Frame Relay
  - Asynchronous Transfer Mode Service (ATM)
  - International Private Leased Circuit (IPLC)
  - Domestic Leased Circuit (DLC)
  - Ethernet Leased Line
  - Super Direct Service
  - greenhouse™ Facilities Management

StarHub

What we offer

Mobility Solutions



- Offers a spectrum of the latest technology in mobile voice / data communications for your business

- 100% network coverage allows seamless communications while on the move

Wireless Access

- StarHub is the initiator and a member of the Wireless Broadband Alliance (WBA) - the world's largest alliance of wireless broadband (WiFi) operators aimed at improving cross-network collaborations and improving customer experiences

- Access wireless data beyond the office, the home or wherever you may travel to, at a trail-blazing speed of up to 11 Mbps

- Roam wirelessly in over 13,000 global hotspots with our membership in WBA

- Wireless mobility in StarHub Wireless Broadband Hubs @ Changi Airport, Suntec and at over 20 The Coffee Bean and Tea Leaf® outlets

Wireless Broadband Alliance

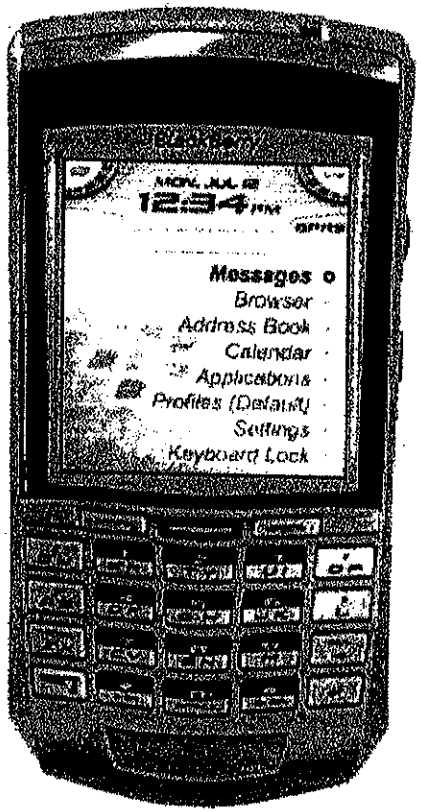
IT'S A GLOBAL THING



StarHub

What we offer

Mobility Solutions – BlackBerry for enterprise



- A secure wireless solution for corporate email and data introduced by StarHub
- GPRS-based and 'Always On, Always Connected®'
- Industry-leading security with Triple-DES encryption
- Doubles as a mobile phone with built-in GSM voice functionality
- Introduced **InfoEdge On-Demand**, a new financial information service on StarHub's BlackBerry solution.

  With data feed from ComStock, InfoEdge On-Demand users can keep track of Equities, Futures/Commodities and Foreign Exchange . Providing you a 24/7 access to the latest market data information, you can enjoy a host of services such as Quotes, Alerts/Triggers, News and Market Watch.
- Introduced **StarHub OfficePlus**, a new value-added service that allows you to enjoy desktop capabilities such as Print Email Messages, Access Files on your corporate network and Read any Email Attachments converted from over 100 file formats.

Introduced **StarHub SMSOffice**, a new communication solution to access emails via SMS messages with web-based tool.

Some of our satisfied customers:

General Electric Company

TEMASEK HOLDINGS

Deutsche Bank

InterContinental Hotels & Resorts

citi

INFORMATICS

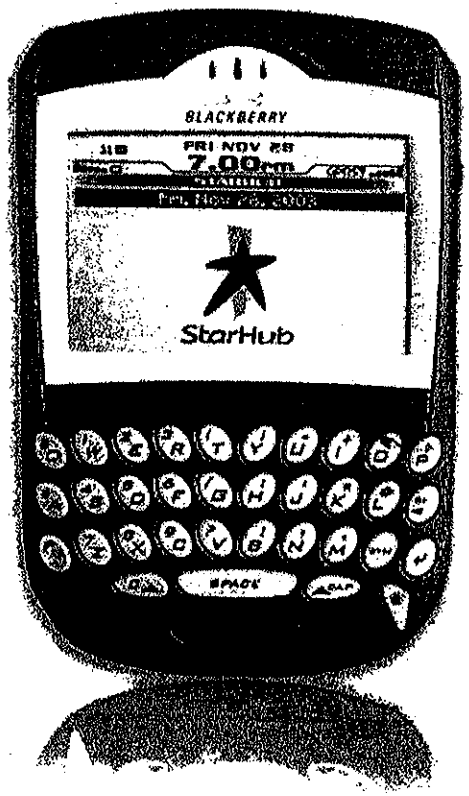
Ernst & Young
Quality In Everything We Do

StarHub

What we offer

Mobility Solutions – BlackBerry for individuals

BlackBerry

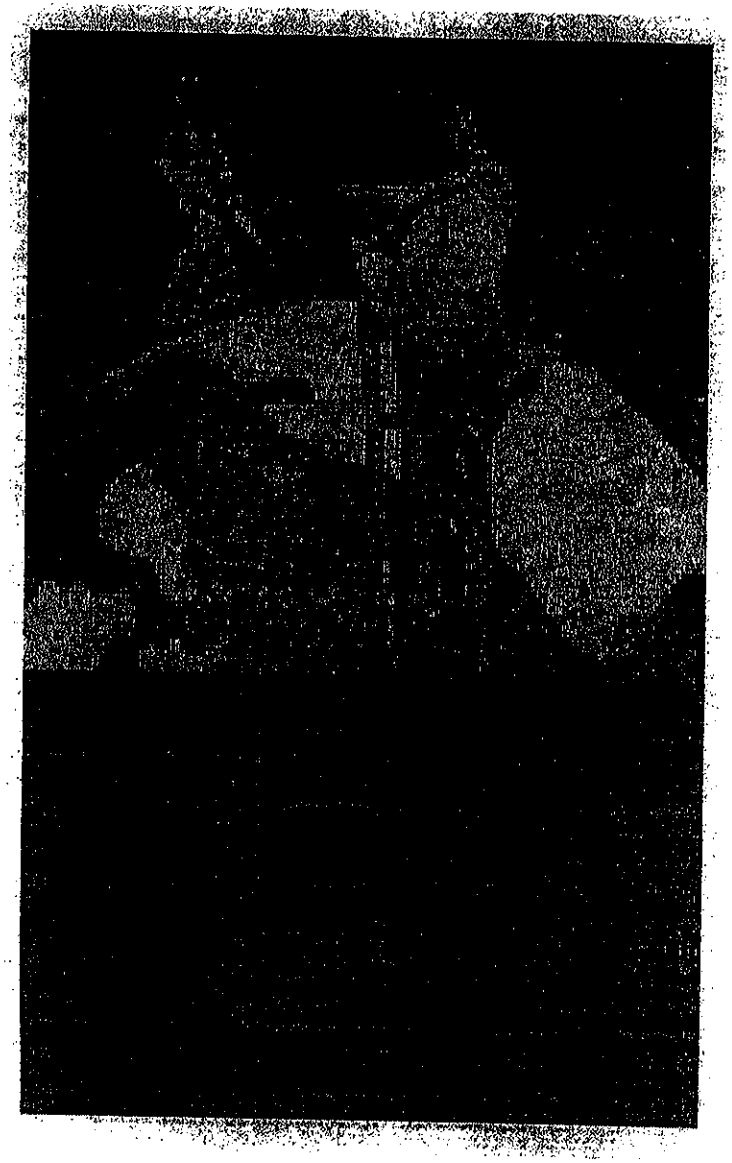


- GPRS-based and 'Always On, Always Connected' for instant access
- Emails are automatically PUSHED to your handheld, hence no need to dial up
- Wireless email (Manage up to 10 business and personal email accounts)
- Roam to more than 92 destinations in Asia, Europe and USA
- Tri-band mobile phone function with colour LCD screen and built-in GSM voice functionality

StarHub

What we offer

International Managed Services



Arcstar International Managed Services

- Arcstar Global IPVPN Service
- Arcstar Global ATM Service
- Arcstar Global Bandwidth Service
- Arcstar Global Managed Services
- Arcstar Global Frame Relay Service

BT International Managed Services

- BT MPLS Service
- BT Business Voice Service
- BT Contact Centre Service
- BT Frame Relay Service
- StarHub Global Conferencing Services

StarHub

What we offer

Information and Entertainment Solutions





- Offers more than 50 quality international channels of news, entertainment and sports over our island-wide network (subject to StarHub's coverage)

- Offers your business the info-edge with a direct link to international and live coverage of world happenings and other vital business information

- Enjoy more choices and value with our round-the-clock quality programming at cost-effective commercial packages

- Market leader who introduced unlimited broadband access at a flat monthly rate

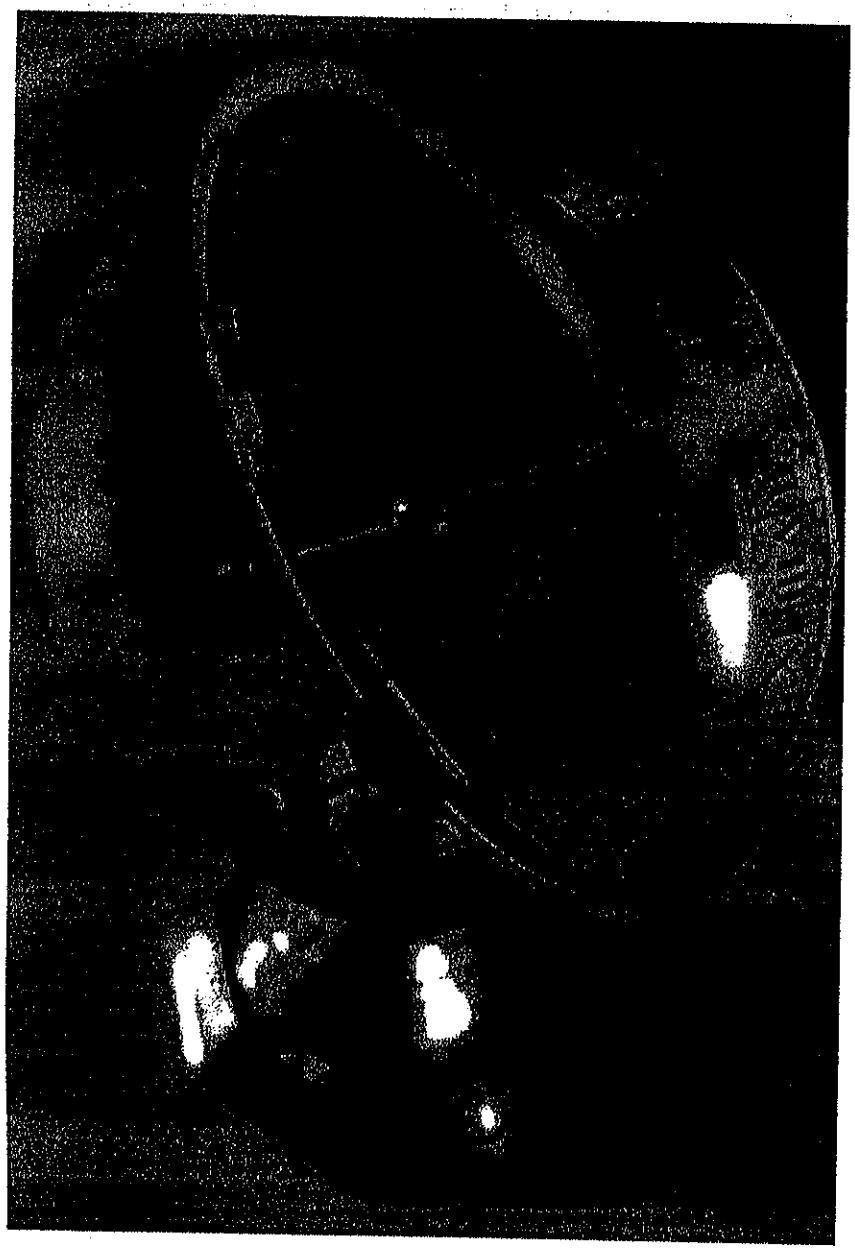
- First in the market to introduce 3 Mbps home broadband Internet access

- Convenient and economical solution for telecommuting

- Enjoy always-on connection

StarHub

What we offer



International & Wholesale Services

- Wholesale StarHub's products and services through partnerships with Facilities Based Operators (FBOs) and Services Based Operators (SBOs)
- Manage international provisioning requirements and interconnection arrangements for existing and new operators
- Provide interconnection facilities to over 50 partners across the globe
- Provide Satelindo (Indonesia's largest private satellite operator) with Internet connectivity in Indonesia via StarHub's Tier 1 Global Transit Service
- Provide direct data and voice services between Singapore and India through partnership with VSNL
- Extension of StarHub's coverage with more key destinations in Europe through partnership with Belgacom of Belgium and KPN of Holland

StarHub

What we offer

IDD Services



- Stay contactable with our range of quality International calling services
- IDD 008 gives you clearly better premium calls
- IDD 018 gives you the best deal in town
- International ISDN gives you great clarity in voice and data connectivity that reaches major destinations worldwide
- Free IDD 018 Calls to Malaysia, USA, Hong Kong, China, Taiwan and Thailand on StarHub Mobile till 31 Dec 2005

IDD 008 Clearly Better

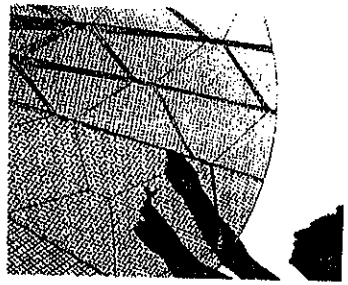


StarHub

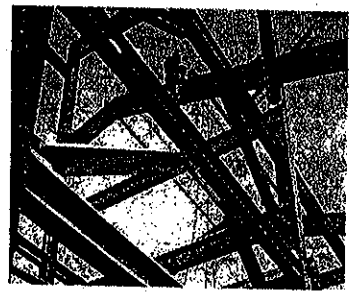
What we offer

Webspeed Services Promotion Package

B-Access ADSL v 512K



FREE HP Business Desktop & Digital Voice Promotion



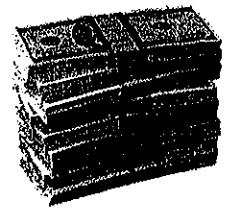
Promo Period: 5 April 2006 – 31 May 2006

StarHub

What we offer

Webspeed Services Promotion Package

Promo Package



ADSL v 512Kbps Pricing

Type	Description	One Time Charge ($)		Monthly Subscription ($)	
				24-month contract	
	Download / Upload	Standard	Promo	Standard	Promo
Dynamic IP					
ADSL v512K *(B-Access)*	512K / 256K	300	100	178	148

-Charges are inclusive of rental of Alcatel SpeedTouch 511e ADSL router

-Prices indicated are exclusive of 5% GST

-Minimal contractual term of 24 months

DV-Biz Basic Pricing

Type	One Time Charge ($)		Monthly Subscription ($)		Purchase of IAD ($)	
			12-month contract			
DV-Biz Basic	Standard	Promo	Standard	Promo	Standard	Promo
	50	0	9.80	0	159	89

StarHub

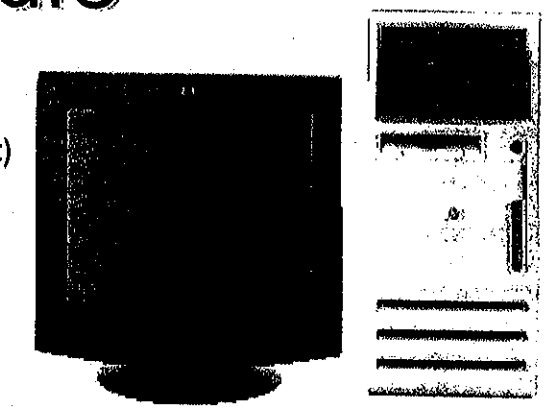
What we offer

Webspeed Services Promotion Package

HP Business PC Bundle

HP dx5000 Series Business Desktop PC (Retail worth $999)

Processor Processor	: AMD Sempron™ 3000+ (1.8GHz, 123KB L2 cache, 64-bit)
Operating System	: Microsoft® Windows® XP Home SP2
Memory	: 256MB PC3200 DDR400 SDRAM
Hard Disk	: 40GB 4200rpm
Optical Drive	: 48X CD-ROM
Graphics	: Integrated ATI Mobility Radeon X300
Audio	: Realtek ALC653 2-channel audio with internal PC speaker
Communications	: Realtek RTL8100c Fast Ethernet Controller
Warranty	: 1 year for parts, 1 year for labor and on-site, next business-day service
Monitor	: HP s5502" CRT Monitor



Picture for illustration purpose

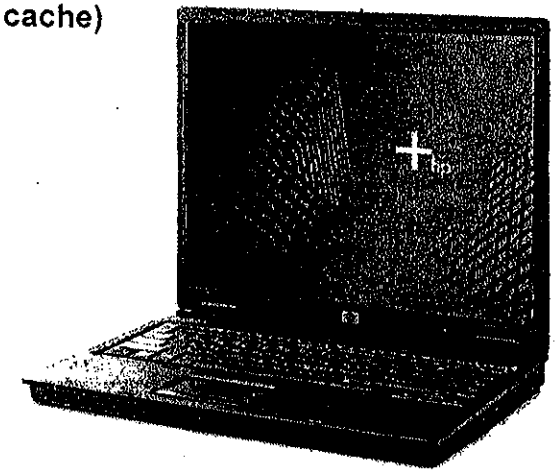
StarHub

What we offer

Webspeed Services Promotion Package

Optional HP Notebook Upgrade

HP Compaq nx6000 Series Retail worth S$1399



Processor	: Mobile AMD Sempron 3000+ (1.8GHz, 128MB L2 cache)
Operating System	: Microsoft® Windows® XP Home SP2
Chipset	: ATI Radeon Xpress 200M
Memory	: 256MB 333MHz DDR SDRAM
Hard Disk	: 40GB 4200rpm
Optical Drive	: 24X CD-ROM
Display	: 15" XGA
Graphics	: Integrated ATI Mobility Radeon X300 with up to 128MB allocated system memory
Audio	: HP Premier Sound 16-Bit sound, line out/headphone jack, microphone jack, integrated microphone, stereo speakers
Warranty	: One (1) year standard parts and labour

StarHub

What we offer

Webspeed Services Promotion Package

2 'GREAT' Reasons for customers to sign up with this promo

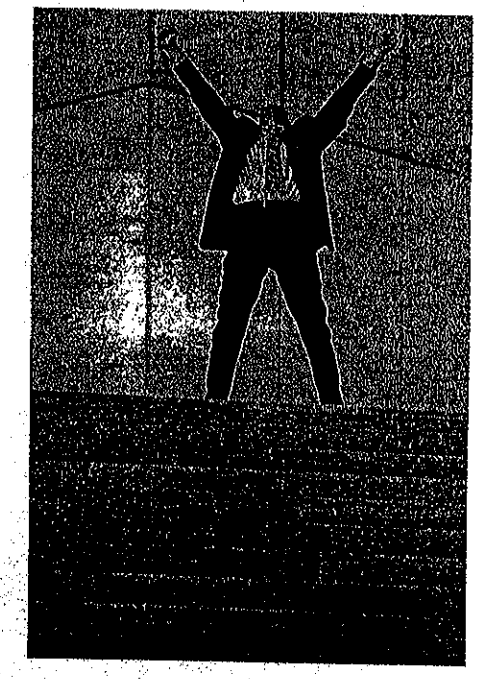
1. With island wide availability, customers can enjoy superior connectivity.

2. Business savings of up to **$4700!!!**

   - **FREE** HP Business Desktop worth **$999**.

   - **FREE** Digital Voice service for 12-months. Customer saves **$117.60** over 12 months.

   - Special promotional ADSL v 512Kbps MRC of **$148** (List price $300). Customer saves $152/month, and total saving of up to **$3648** over 24 months.
   - FREE lease of ADSL router.



StarHub

What we offer

IP/Internet Services Promotion Package



Business

Surf For Free

Surf for Free with StarHub
for Corporate Customers
FREE Internet bandwidth
over 2M leased line

StarHub

What we offer

IP/Internet Services Promotion Package

For StarHub Covered Sites:

StarHub Covered Sites	Promo OTC	Promo MRC
2M Platinum Internet	$0	$0
2M DLC (SDA)	$750	$1,102
V.35 Converter	$60	$85
Router	$0	$150
Service Mgt Fee	$0	$58
Total Promo Price	**$810**	**$1,395**

Surf for FREE

with Internet charges waived!!!



StarHub

What we offer

IP/Internet Services Promotion Package

For Non-StarHub Covered Sites:

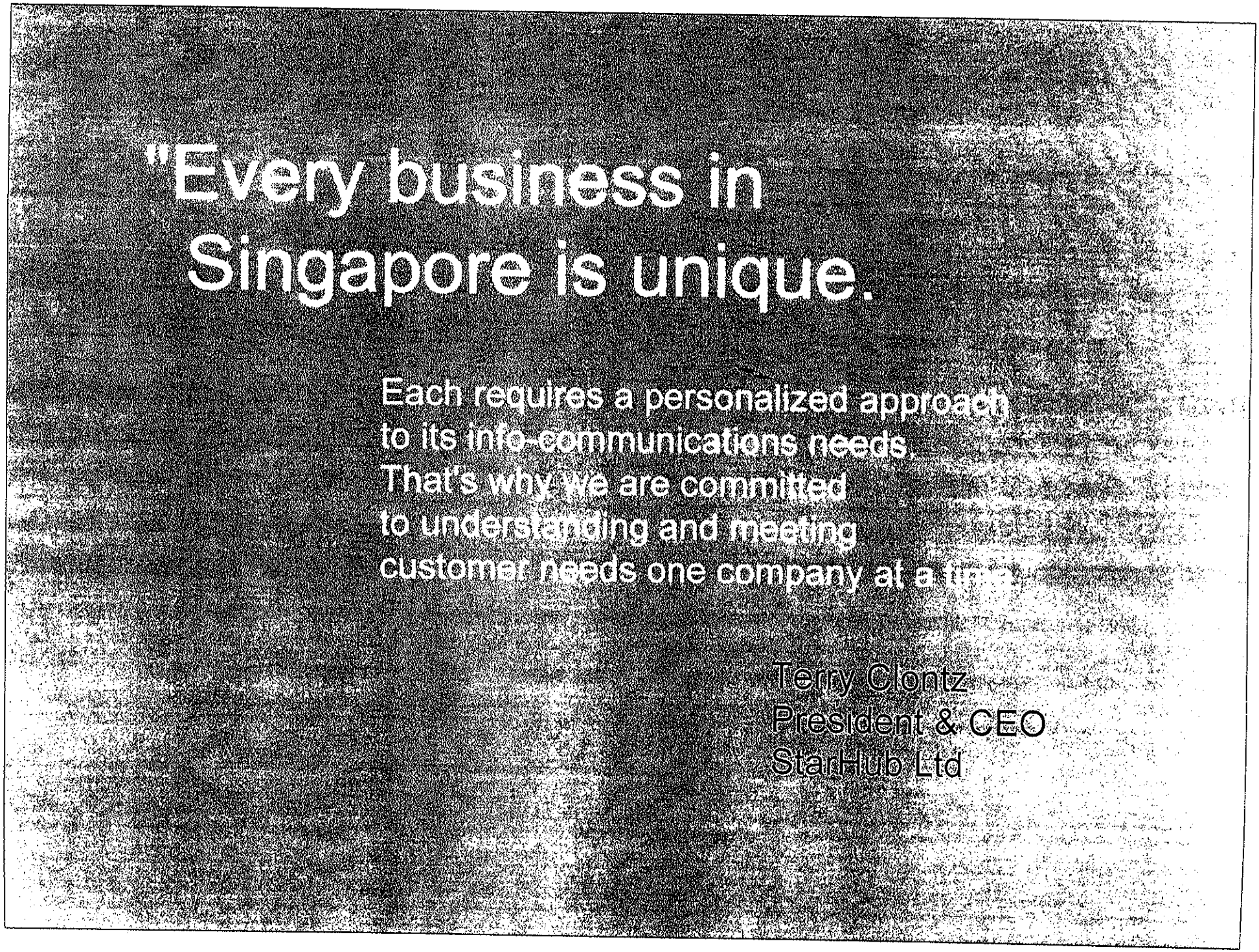
Non-StarHub Covered Sites	Promo OTC	Promo MRC
2M Platinum Internet	$0	$0
2M DLC (ST WebLink)	$1,200	$1,200
V.35 Converter	$1,000	$0
Router	$0	$150
Service Mgt Fee	$0	$300
Total Promo Price	**$2,200**	**$1,650**

Surf for FREE

with Internet charges waived*!!!*

Business SurfForFree

StarHub


"Every business in Singapore is unique.
Each requires a personalized approach to its info-communications needs. That's why we are committed to understanding and meeting customer needs one company at a
Terry Clontz
President & CEO
StarHub Ltd


There's always a better way.
StarHub Business Solutions.

End of Presentation

THANK YOU !!

StarHub