Development and Implementation of Integrated Electronic Weighing, Recording and Video Monitoring of Catch Landings – SA Southern Zone Rocklobster Fishery

Mr Roger Edwards

Australian Government

Fisheries Research and Development Corporation

Project No. 2006/234

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Table of Contents

List of Figures

NON TECHNICAL SUMMARY

2006/234 Development and Implementation of Integrated Electronic weighing, recording and video monitoring of catch landings – SA Southern Zone Rocklobster Fishery

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OBJECTIVES:

1. Manage supply, installation and operation of an Integrated Electronic Catch Weighing and Video Monitoring System.
2. Develop and implement an industry extension program to support introduction of the system.
3. Established an independent review of the system and prepare reports.

1 Outcomes Achieved To Date

The project has involved the development and implementation of integrated electronic recording and video monitoring of catch weighing, at 7 port locations in the SA Southern Zone Rocklobster Fishery.

The system delivers automatic weighing and recording of catch weights against quota balances at landing for licence holders, and real time remote observation of landings and weighing by the SA Primary Industries and Resources (PIRSA) Compliance group, 24 hours/day through the season.

The system is integrated into the PIRSA catch recording system PIMS, with weights decremented against the licence holder's quota balances daily.

An extension program to support the introduction of the system was implemented, with 100% licence holders and crew members involved in catch weighing successfully using to the electronic weighing system. The weighing system has operated for the past 2 seasons.

At the individual fisher level the system saves time in calculating weights and when the system is fully integrated into the compliance program in the 2009-10 season, the paper Cath Disposal Record (CRD) at the scales will not be needed. In addition the skills base of the entire industry has moved to electronic data gathering and recording.

At the whole of fishery level the catch data is stored and retrieved electronically from each port nightly, thereby delivering time savings in both paper collection costs by couriers and manual data processing. The system is expected to be fully integrated into the compliance program in the 2009-10 season, and this will deliver a commensurate reduction of licence fee cost to the industry.

The integration of digital weight data with vision has created a new dimension in monitoring the catch landing and weighing process, with observations of up to 7 locations by 1 person remotely in real time. The development replaces some of the need for visual inspection of the weighing process and confirmation of catch weights.

An independent review of the system was completed and the overall cost to licence holders for the compliance and monitoring program was reduced for the 2009-10 season onwards, as a result of the early efficiencies captured through the system.

The capacity to review weighing after the event e.g. post season when the compliance group is undertaking audits has added capacity for time savings and potentially for more effective compliance outcomes.

Further assessment of overall compliance program efficiencies will occur following full integration of the program in the 2008-09 season.

The project has also resulted in a platform for receiving and storing data electronically to meet a range of requirements including State stock assessment and DEW environmental assessments. Options to expand the system are currently being explored by industry and PIRSA.

A wider industry outcome is that the system is directly transportable to other quota fisheries which involve compliance observation of the weighing process and manual catch weight transfer and processing.

Finally a public benefit of enhanced deterrent to theft and vandalism at the ports through the additional security established with the 24/7 video surveillance has resulted.

Full integration of the system into the PIRSA compliance program was slower than anticipated due to timing issues with development of the PIRSA PIMS system and internet communication (i.e. broadband) reliability and consistency problems at 3 of the 7 ports.

Investment in specialist communication support in addition to the project was required to maximise the outputs from the system.

Future development will involve accessing more reliable and faster broadband at all ports as it becomes available and increasing the data sets recorded through the platform.

KEYWORDS: Southern Rocklobster Fishery, electronic weighing, recording and video monitoring of catch landings.

2 ACKNOWLEDGEMENTS

The project has involved a partnership between industry, PIRSA and service providers.

3 BACKGROUND

The SA Southern Zone rocklobster fishery operates to a strict catch quota arrangement. Catch landings have been monitored by visual inspection at 7 ports by dockside monitors (2000/01- 2004/05) and compliance officers. Catch weight is recorded on paper Catch Disposal Records (CDRs) which are manually processed into the PIRSA fisheries catch recording database (FLAMS).

The industry has operated on full cost recovery since 1992, and pays the full cost of compliance officers, infrastructure, dockside monitors and CDR processing.

The industry, represented at the State level by the SA Rock Lobster Advisory Council – (SARLAC) and in the Southern Lobster Zone by the South Eastern Professional Fishermen's Association (SEPFA) and PIRSA Fisheries, work together from time to time on projects relevant to developing the management arrangements for the fishery.

The development of an integrated electronic monitoring and weighing concept has been driven by industry leaders through SEPFA. Their long term vision is to establish an integrated system from "deck to database" covering all data needs including:

1. Research (SARDI),
2. Compliance (PIRSA),
3. EPBC Act (DEH)
4. Industry Clean Green program (Southern Rocklobster Limited - SRL) and
5. Market including full product traceability (SRL).

Over a number of years the industry has been working with PIRSA Fisheries to investigate the feasibility of an integrated electronic monitoring and recording of the lobster catch with the objectives in the long term to maintain:

1. Integrity in the quota system,
2. Accurate weighing of the catch,
3. Accountability of the catch weights,
4. Verification of the catch weights,
5. Observation of landing and weighing procedure,
6. Security of the equipment and guaranteed confidentiality of individual data and images, and
7. Cost-effective quota monitoring.

In 2002 electronic weighing of the catch was successfully trialled in Beachport using electronic scales and individually tagged bins. The catch weight in each bin was automatically established by the scales, recorded against the individual's quota and transferred to PIRSA.

The trail was followed by further assessment of electronic weighing and monitoring options, and by 2004 it was apparent that integration of the electronic weighing process and video monitoring using shared infrastructure was possible.

In 2004 an independent consultancy by REXEL established the broad scope for the establishment and operation of an integrated catch weighing and video monitoring system. In the 2005-06 season a stand alone system of video monitoring was trialled at Robe. The trial involved video coverage of the port, dock area and weighing process. The video recording occurred 24 hours/day for the season and images were

accessed in real time remotely by the compliance group.

In late 2005 into early 2006, an independent review of the Robe video trial was conducted by Warner and Associates. Warner and Associates assessed the video trial in terms of deterrent value, use in intelligence gathering and use as evidence. The independent report concluded in relation to video monitoring, inter alia "…there will be enormous benefit as a tool to assist with compliance practices."

This project was established to manage design, development and implementation of the infrastructure and system for integrated electronic data collection at the wharf, data transfer and centralised management, and dealing with video monitoring of the weighing process in accordance with the PIRSA Compliance group requirements.

4 NEED

The fishery is managed within the broad sustainability framework provided by the Fisheries Act 2007 and in accordance with the Southern Zone Rock Lobster Fishery Management Plan 2007. The Act has a clear objective I terms of cost effective management. In addition the industry is subject to the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), and the fishery is assessed to confirm that it is operating within the 'guidelines for the ecologically sustainable management of fisheries.

The mainstays of ensuring stock sustainability under these Acts are to ensure the catch quota is not exceeded and that information is available to undertake accurate stock assessments. This requires effective and timely monitoring of landings and accurate weighing of catch along with deterrents to avoiding quota and prosecution when breaches occur.

Under a full cost recovery regime these costs are borne directly by licence holders in the fishery and the Southern Zone industry invests in the order of $1.2m per annum through licence fees on compliance.

Over time industry seeks to reduce these costs and/or capture efficiencies while ensuring sustainability of the lobster stocks.

This project is an industry initiative aimed at more cost effective data collection and management and compliance in line with the objectives of the Act and the commercial aspirations of the industry.

5 OBJECTIVES

1. Manage supply, installation and operation of an Integrated Electronic Catch Weighing and Video Monitoring System.
2. Develop and implement an industry extension program to support introduction of the system.
3. Established an independent review of the system and prepare reports.

6 METHODS

Co-investment by FRDC, PIRSA Fisheries and the Southern Zone Rocklobster

industry occurred and funds were expended on infrastructure (hardware, software and communications platform), project management, service providers, communication, training and extension activities to deliver the project objectives.

The project was conducted in 3 parts namely:

6.1 Establishing the technical specifications and service providers.

The system technical specifications were developed after consideration of the previous trial work in SA and other national initiatives for example the Australian Fisheries Management Authority (AFMA) catch weighing. Information was collated and assessed and further developed at a stakeholder workshop at which the key components of the system were specified. The approach to securing services providers was also determined at the workshop.

Additional information about the activities in this part of the project is provided below.

6.1.1 Project Team

A project team was established with responsibility for delivering the project. The team included:

- 2 Industry members
- PIRSA Contract Manager
- Principal Investigator/extension officer
- FRDC representative
- PIRSA Fisheries Manager

The principle investigator managed the project, reporting to the committee as required. Numerous meetings were held by the team to review progress and deal with issues as they arose.

6.1.2 Stakeholder contributors

A range of other stakeholders were linked to the project on an as needs basis. In particular the PIRSA compliance and IT groups were key participants providing input and direction for the system specifications at all levels, in particular in establishing the linkages to the PIRSA data base.

In addition the project linked to the 7 local port associations for input and guidance on local site developments and implementation of the extension program.

The principle investigator managed the stakeholder groups and maintained regular communication with them about progress.

6.1.3 Stakeholder workshop

A review of national initiatives was undertaken including a meeting with AFMA to explore developments at the Commonwealth level. It was confirmed that there is no system in place that is similar to that proposed for Southern Zone.

A draft set of technical specification was developed by the principle investigator drawing on previous related R&D work. Information was drawn from specialist stakeholders as follows:

- PIRSA IT group who provided advice on requirements to successfully link with the PIRSA data base
- PIRSA Compliance Unit who provided input into infrastructure at each port, direct requirements for facilities, training and communication within the Unit and direct requirements for the regional office in Mount Gambier and
- industry leaders who provided direction and feedback on technical progress/issues.

The project team and stakeholders participated in a workshop at which the following were undertaken:

- National initiatives reviewed
- Technical specifications finalised
- Project risk assessment
- Service providers identified
- Team member roles and responsibilities established
- Team communication protocols developed
- Training and extension program developed and
- Work plan and timetable agreed.

The principal investigator prepared briefing papers and managed all aspects of the workshop. The workshop outcomes provided considerable guidance to the overall project, final technical specification and extension program.

6.1.4 Acquisition process

The project involved purchase of equipment and services to be provided by private sector organisations. The project team decided on a selected tender process targeting providers located in the region where the system was to be installed.

The overriding aim was an acquisitions process that ensured competitive pricing but more importantly delivered a quality system to specification and with local back up.

Tender evaluation criteria where established by the project team (See Appendix 3) and it was agreed that the project team would undertake the evaluation process.

6.1.5 Tender document

A tender document was created based on the outcomes of the stakeholder workshop, for provision to tenderers/service providers (See Appendix 4). It provides

detail on the project processes, technical specifications, performance measures, timelines and terms and conditions.

The tender documents were provided to the target service providers by the principal investigator and tenders were received by the closing date selected.

The project team evaluated the tenders and service providers to cover the respective video and weighing components were selected. The PIRSA Contract Manager provided specialist advice and support to the process.

6.2 System installed 7 ports

Following selection of the services providers the system was installed across the 7 ports. Communications infrastructure and power were established first followed by the video equipment and weighing systems. Ongoing interaction with the selected service providers and communication with stakeholders occurred during this stage of the project.

In addition an industry extension program was developed and implemented to support the transition of licence holders from the previous manual system to the electronic system.

Additional information about the activities in this part of the project is provided below.

6.2.1 Manage the Contracts

Only 2 of the 4 organisations approached submitted quotations and these were assessed as acceptable against the criteria, with price within the budget.

Following the acquisition process, the successful service providers were notified and engaged to deliver the system. Performance against the specifications was monitored by the project team and payments made against delivery.

6.2.2 Communication and Extension

The extension program developed to achieve adoption by the industry is shown in Appendix 5. The principle investigator is qualified in extension and has worked extensively in rocklobster extension. An uptake target of 100% was adopted as anything less as maintaining 2 recording systems would have negated the benefits on offer and resulted in higher costs to industry.

The extension program involved 6 key elements:

1. Enlisting licence holders who are early adopters of innovation and key leaders who initiate changes in the industry, as the “champions” and information points for the introduction of the system.
2. Communicating the features and benefits of system via a range of communication media including the “champions”.
3. Communicating system features and benefits directly to fishers on at least 3 occasions prior to introduction.
4. Training all participants in system use prior to introduction at the scales
5. Provision of written instructions to licence holders and at the scales
6. Follow up support in season at the scales and by telephone and at the scales.

The target audience were all people involved in catching weighing i.e. licence holder, skippers and crew.

The key messages delivered about system were that it:
- is an industry initiative
- has widespread support from licence holders
- demonstrates your commitment to protecting the stock
- is an investment in protecting your profits and licence values
- allows you to show you are honest
- exposes dishonest behaviour
- helps compliance focus
- promotes a positive image in the eyes of the public and
- will save you money as the reduction in licence fees will be greater than the cost.

The communication channels used to ensure multiple exposures to the system information by those expected to use it included:
- Zone Association SEPFA
- Port Associations
- Media
- industry leaders– the champions.

Tools used included (see Appendix 6 for examples):
- Presentations: Port meetings/seminars - Features/benefits and implementation.
- Circulars: Update on implementation progress, Flyer – “how to” use system
- Training days – one on one at the scales
- Instruction notice at scale – as per flyer distributed
- One on one at-scale support - information on weighing procedure week 1 of season.
- Updates provided through annual pre-season one on one session
- Telephone support. Information on weighing procedure
- Wider industry/community - Media and Newsletter & fax/email network

6.3 System reviewed

An independent (of industry and government) consultancy review of the operation and effectiveness of the system from a compliance perspective was undertaken. The specifications for the review are provided in Appendix 7.

In addition, a further unplanned and unbudgeted review of the internet communications platform supporting the data transfer and video streaming was undertaken. This occurred in response to reliability and quality issues that emerged during implementation of the system. The scope of works is provided in Appendix 8.

7. RESULTS AND DISCUSSION

The integrated electronic weighing, recording and video monitoring of catch landings system has been installed in each of the 7 planned locations. The system has the capacity to allow electronic weighing and observation of the landing and weighing process in real time.

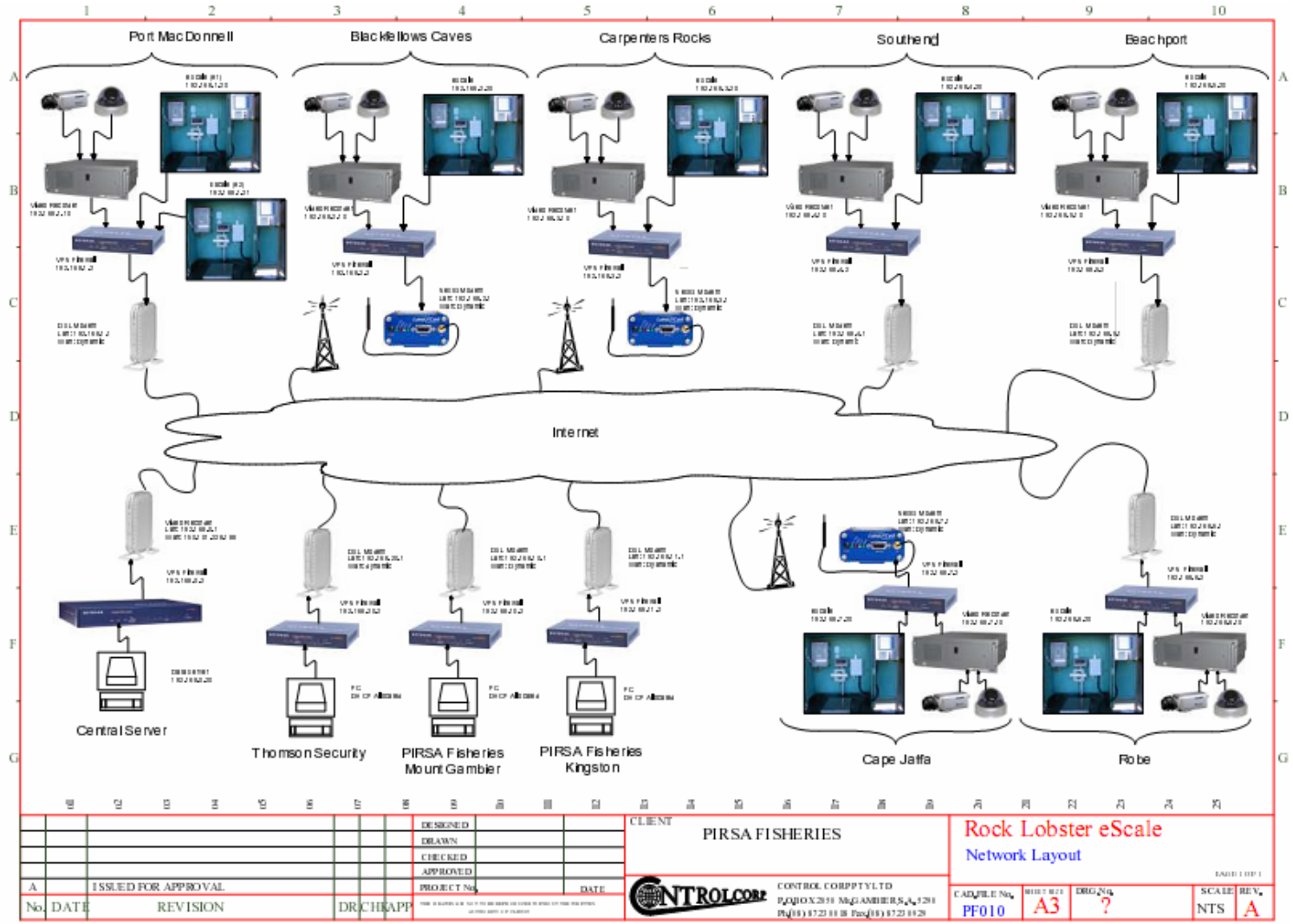
Full system specifications and operating manuals have been produced and these remain the property of the South Australian Southern Zone Rocklobster Industry.

Two types of data are created namely video images and catch weighing records. The system is integrated into the PIRSA catch recording system PIMS, which become operational in late 2007 and to the PIRSA Compliance group in Mount Gambier.

A summary of the system features and operating procedures follows and a network schematic is shown in Figure 1.

The system is set to become fully operational in the 2008-09 season.

Figure 1 – Network schematic



7.1 Scales Component

The electronic scales component of the integrated system is a fully customizable robust, reliable and user friendly system (See Figure 2).

The system allows the following to occur:

- Collect Part A & Part B information as per fisher catch disposal record (CDR)
- Automatically record net weight of Lobster & Crab
- Tally total daily weighing by species per fisher and show Quota remaining
- Collate weighing data for PIRSA electronically (Transactions are sent to the master computer located at PIRSA Fisheries)
- direct access by compliance officers to interrogate previous weighings and bin registered weights.
- to register new bins or fishers at each station
- reconciliation of quota

The hardware involved in the scales component is as follows:

- Electronic Scale with external communicability
- Electronic indicators)
- Main Electronic Processing Unit (12.1” Panel Based PC) with touch screen
- Bin Tag Reader (RFID)
- Docket Printer
- Modem
- System Software and
- 24v DC Uninterrupted power supply
- Stainless steel secure housing

Each fisher has been issued with a Personal Smart Card (iButton) and software was established to register the iButton in the name of the License Holder. Software was also established to register each of the licence holders bins used for transport of lobster from vessel to the scales. Bin empty weight was recorded and a radio frequency identification tag was attatched to the bin.

Figure 2 – E-scales

On unloading lobster the fishers proceed to the weigh station. At the weigh station the fisher inserts the iButton into the receptacle and enters his pin number on the touch screen display. He has to confirm the CDR number that automatically comes up on the screen (sequential) or key in the correct CDR number.

The fisher places lobster bins, one at a time, onto the scale such that the tag is directed toward the detector. Once the bin has been identified it is weighed and the fisher is required to confirm the weight. Once confirmed a message on the screen indicates to the fisher to proceed with the next bin. Once the last bin has been weighed the touch screen displays a weighing report which the fisher reviews and confirms correct. Once the information is confirmed correct a docket is printed, on a thermal printer.

The software has been established to allow compliance officers to use iButtons and log into each weigh station and perform the following functions:

- Review the empty weight of all registered bins.
- Review all transactions completed that day, at that weigh station.
- Register a new fisher iButton
- Register new bins
- Check Zero and 20kg calibration of scale

7.2 Video Component

The video component of the integrated system supports:

- Video recording at the 7 ports 24 hours/day 7 week during the season.
- Production of high quality mastered images providing effective observation of the landing and weighing process.
- Centralised monitoring of remote weighing stations by PIRSA compliance group

The site video schematic is shown in Figure 3.

The hardware at each site involved in the video component is as follows:

- brackets and associated wiring and connections at 7 weighing stations
- Colourbond weatherproof structures to house the recording equipment (see Figures 4 and 5).
- Power and telephone to each location.
- Recording systems each complete with a minimum three (3) vandal proof cameras - inside weigh station front on shot, bay area and general weigh station area (see Figures 6 and 7).

Images are maintained on site on a DVR and are downloaded on an as needs basis. Features include:

- Automatic event recording activated by movement
- Intelligent search capability based on time events or activity
- Automatic dial up to monitoring station
- Catch weights being superimposed in the video vision establishing a real time record of weights linked to the weighing process.
- Capacity to record with up to 6 cameras for 8 months

Figure 3 – Video Schematic

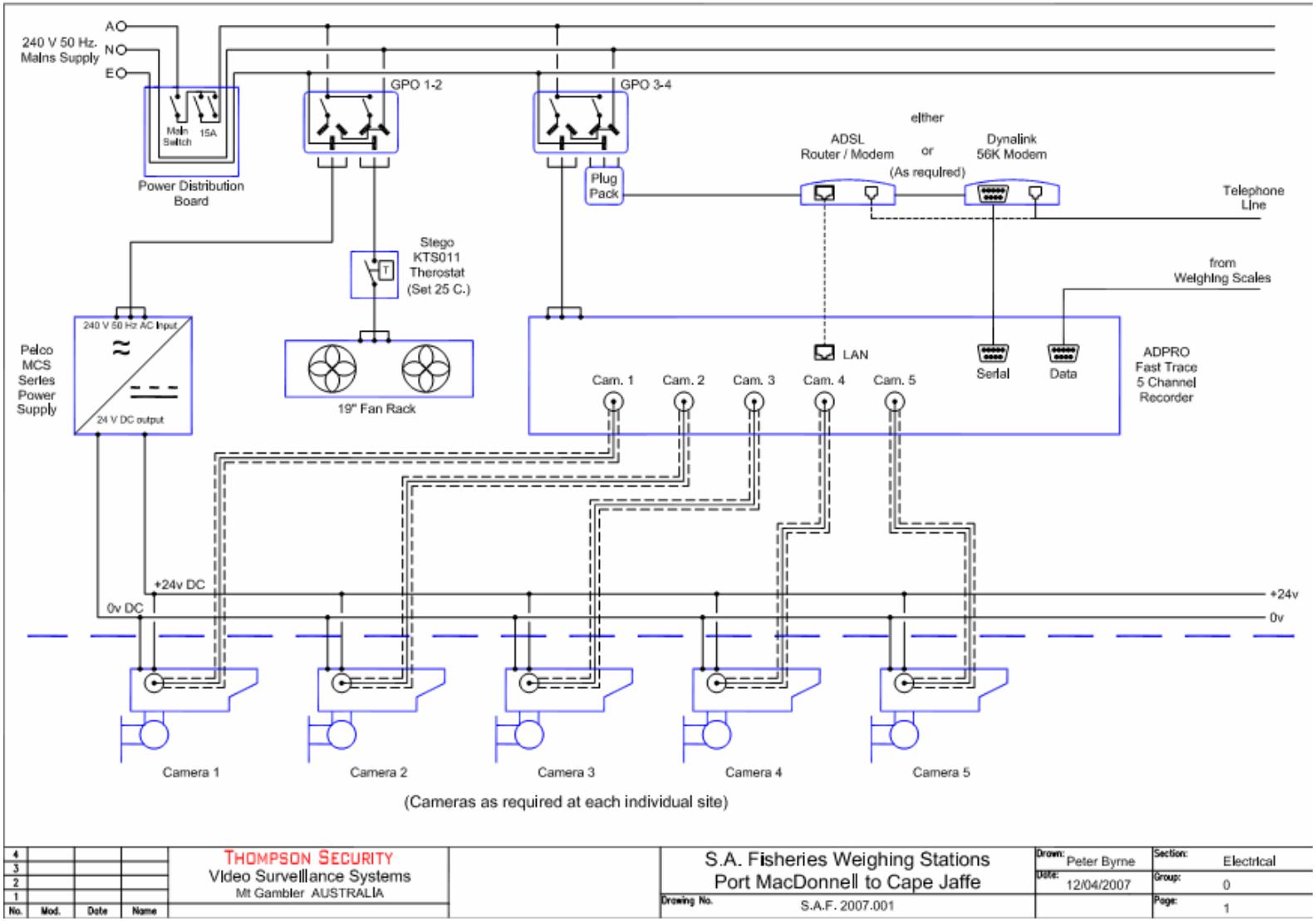


Figure 4 – Scale and recording equipment shed (right)

Figure 5 – Recording equipment

Figure 6 – Camera Mounted Inside Weighing Shed

Figure 7 – Cameras Covering General Area

7.3 Collation of data

The software and hardware established allows each weigh station to transmit data to PIRSA Fisheries via the internet. PIRSA fisheries personnel have been trained to access the system for video images and weighing data.

The catch weight information is stored locally on PC's at each port and then collated centrally on a data collator server in Mount Gambier. The Mount Gambier server is linked to the PIRSA PIMS system where the permanent legal record is maintained. Catch weights are upload each night to the PIRSA PIMMS data base and new quota balances are then downloaded to the ports PCs.

The video recorders hold images from a full season which can be copied and stored on CD-Rom or deleted following review at the end of each season.

7.4 Maintenance

Service and support contracts have been established with the respective video and scale contractors. A technician is on 24 hour callout roster to attend to scale malfunction and a hotline provides support for users during the season.

The video recorders are housed in secure padlocked stainless steel cabinets at each site. Video performance is monitored remotely by the service provider and quality and performance issues are dealt with as required as part of the maintenance contract.

In addition equipment supplied carries warranties for repair. This warranty covers parts and labour on failures of new equipment due to normal wear and tear.

7.5 Extension Results

There are 180 licence holders in the fishery with about 165 active vessels operating. Each vessel typically has 2 crew members. The extension program was aimed at having all bins (approximately 3600) set up with RFD tags and 100% of all people involved in weighing the catch the being capable of using the scales.

Throughout the project ongoing planned communication (See Appendix 5) was undertaken with industry, other relevant stakeholders and Government agencies. In addition, given that the sites involved public places, liaison with local community and relevant government departments was undertaken. In summary the extension activities covered:

- industry communication and training
- ongoing industry support at start up and during the season
- dealing with any site issues with local Government and State Departments
- compliance group training and
- wider community information.

The extension program was an overwhelming success culminating with "bin tagging" and training days for all individuals involved in the weighing process. Fishers have used the weighing system for 2 complete seasons with infrequent issues. Very high levels of support for the system are maintained as it has delivered a less complex weighing process for fishers.

Figure 8 - Bin Tagging Days

Figure 9 - System Training

7.6 System Evaluation

The infrastructure was installed in the lead up to the 2006-07 season in the respective ports. The weighing component has been used by the licence holders since that time, but full implementation of the system has not occurred for the following reasons:

- Development of the new PIRSA catch data base (PIMS) which the system was required to link with, was not completed until late 2007, and
- The internet network experienced unforeseen communications issues which impacted on reliability, access and quality.

An independent (of industry and government) consultancy review of the system operation and effectiveness was undertaken. The reviewer was required to consult with commercial industry representatives and PIRSA Fisheries staff during the review process.

The review findings are provided in Appendix 9 and are summarised as follows:

- The system is not at a stage where the full potential can be assessed to the extent we believe will be the eventual outcome.
- As a result of communications difficulties, it has not been possible to integrate both systems.
- Cameras, recorders and electronic scales at the weigh stations at each port have been installed professionally and are able to record all information at the site.
- The electronic scales have been an outstanding success, widely accepted by all stakeholders. Once again, full potential has not been realised owing to communications difficulties.
- In anticipation of both video and electronic scales data being integrated, it will be necessary to refocus resources, particularly Compliance, to enable full advantage of the new technology.
- It is accepted that weigh stations are only one area of concern with regard to compliance issues, however, it will be possible to plan and implement strategies at other locations based on the collated data and vision available from the new system.

The communications problems were not able to be rectified by the contractor during 2007 and in response in early 2008, the industry agreed to additional funding for a specialist consultancy to investigate and rectify the problems. The consultancy report is provided in Appendix 10.

The communications review recommendations were implemented and by the end of the 2007-08 season the communications issues had been dealt with to a level that allows acceptable function of both the scales and video components.

The system is set for full implementation in the 2009-10 season.

8. BENEFITS AND ADOPTION

The key development components of the project are:

1. Observations of landings and weighing are now possible at the 7 ports remotely in real time. The development has replaced the need for visual inspection of the weighing process and confirmation of catch weights by compliance officers. Visual observation of the landing/weighing process and weight and recording by dockside monitors and/or compliance officers have ceased (other than random checks guided by video information).
2. Digital weight data is integrated into weighing vision to create a new dimension in monitoring the removals from the fishery.
3. Capacity to review weighing after the event e.g. post season when undertaking audits is a further is a further benefited dimension.
4. The paper Catch Disposal Record (CDR) is now redundant and manual processing is no longer required and
5. CDRs collection by couriers is no longer required.
6. “Core hours”, being the hours during which boats do not need to report by telephone prior to landing have been extended and standardised across the fishery (lessens reporting burden on skippers and reduces costs of monitoring core hours).

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Each of these elements either reduces actual cost to the industry through the licence fee and/or allows more efficient operations by the compliance group.

As part of implementation of the system a reduction of 100 compliance officer days has already occurred with a direct reduction in licence fees. Following full implementation, and subject to a review of the full operation, PIRSA has agreed to reduce the compliance officer days (and therefore costs to licence holders) by 100 days.

The following are additional benefits:

1. Licence holders have daily quota balances
2. The skills base of the entire industry has been moved to electronic data gathering and recording,
3. Capacity and the platform has been created refer dealing with all data requirements including State stock assessment and DEH environmental assessment.

Finally the system is directly transportable to other quota fisheries which involve human observation of the weighing process, manual catch weight transfer and processing. The local abalone fishery is a good example and the SA blue crab fishery is a second.

The system involves fishers adopting a new automated approach to weighing and recording catch. All persons actively involved in weighing the catch during the season (approximately 400) required training in the new system. The system has been embraced by industry 100% of the industry now using the electronic scales to weigh their daily catch.

9 FURTHER DEVELOPMENT

The next stage for the project is full implementation parallel to the current paper system, commencing October 1st 2009. A decision will then be made by PIRSA about ending the paper CDR system and manual data processing.

Two other activities are underway that will link to the project in the future. The first is FRDC "Standardising data collection across the southern rocklobster fisheries". It is anticipated that the outcomes of this project will involve some form of on-boat data collection for a range of purposes, and transfers of this data will be able to be made through the integrated system that has been established.

The second area is in relation to Part A of the CDR which is a paper record made on the vessel prior to landing. The system has been developed to allow electronic recording of Part A at the port and the next stage of development planned by the industry is to establish capacity to lodge Part A electronically to the scales from the vessel. Work has commended by industry on the options.

10 PLANNED OUTCOMES

The project has met the planned outcomes to establish integrated electronic weighing and monitoring at the 7 ports in the fishery with uptake by industry Full implementation has been delayed due to the communications issues encountered. Ongoing work is occurring aimed at full implementation in the coming season.

The introduction of electronic weighing to the industry has been achieved with 100% of all operators now using the scales.

11 CONCLUSIONS

The project has been a success in that the infrastructure, system and operations have been established to integrate catch weighing and monitoring at the 7 ports in the fishery.

The project encountered serious internet communication issues which delayed full implementation. It is anticipated that further issues may emerge given the general reliability standard of the internet in regional South Australia. However over time it is also expected that the standards of internet will improve an this will see improvements in the system. It has been a learning from this project to involve communications experts, not just systems experts, at the stage of developing project specifications.

Communications reliability primarily impacts on the video aspect of the system, as the electronic catch weight data is stored locally and can be retrieved at any time if the internet fails.

The investment by the industry has been in the order of $500,000 and it is anticipated the savings ongoing through reduced licence fees will be in the order of $100,000 - $200,000 per annum when implemented. This represents a 20%-40% return on investment and does not take into account other less measurable benefits as reported above.

APPENDIX 1 - INTELLECTUAL PROPERTY

Full system specifications and operating manuals have been produced. These are not for distribution.

APPENDIX 2 - STAFF

Roger Edwards – Corvel Marketing and Management
Kelly Crosthwaite - PIRSA Fisheries
John Cock – PIRSA Fisheries
Mel Snart - PIRSA Fisheries
Hamish Telfer – PIRSA Fisheries

APPENDIX 3 – TENDER EVALUATION CRITERIA

	Tenderer Name:	
	Section:	**Criteria**
1	**Previous Experience**	similar projects evidence provided
		Referees
2	**Project Personal**	skills - management, technical
3	**Business Proximity**	Location
4	**Business Capacity**	Workplan approach
		maintenance & support
		Timelines met
		integration with other contractors
		insurances
5.1	**Scope - video**	all docks covered
		power & phone covered
		Technical specifications met
		housing solution
		Security
		back up solution
		training covered
		Manuals covered
5.2	**Scope - scales**	all docks covered
		Technical specifications met
		scales utilise existing
		tags
		Software delivery
		housing solution
		Security
		training covered
		back up cost
		Manuals covered
5.3	**Scope - general**	work understood
		tender prepared in line with requirements
	Score	

APPENDIX 4 TENDER DOCUMENT

Scope of work

for the supply, installation and support of an "Integrated Electronic Catch Weighing and Video Monitoring System"

South Australian Southern Zone Rocklobster Fishery

July 2006

FRDC Project Number 2006/234

Commercial and in confidence

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1. IMPORTANT NOTES

- Your organisation has been identified as a candidate to provide a quote for equipment and services described in this document.
- At any time PIRSA Fisheries may choose not to proceed with the quotation process.
- This is a briefing paper to assist potential contractors to prepare a quotation if they choose to do so.
- The final service specification may vary from that described here.

2. INTRODUCTION

The SA Southern Zone Rock lobster Fishery Management Committee (FMC) provides advice to the South Australian Minister for Agriculture, Food and Fisheries on management of the rocklobster fishery in the South East of the State.

The lobster fishery operates to a strict catch quota arrangement. Catch landings have been monitored by visual inspection at 7 ports by dockside monitors (2000/01-2004/05) and compliance officers. Catch weight is recorded on paper Catch Disposal Records (CDRs) which are manually processed into the PIRSA fisheries catch recording database (FLAMS).

The Fisheries Research and Development Corporation (FRDC) provides funding for fisheries research and development and manages a range of R&D projects with the PIRSA Fisheries and the rocklobster industry.

The FMC, industry (SA Rock Lobster Advisory Council – SARLAC) and PIRSA Fisheries work together from time to time on projects relevant to developing the management arrangements for the fishery.

The development of an integrated electronic monitoring and weighing concept has been driven by industry members of the FMC. Their long term industry vision is to establish and integrated system from "deck to database" covering all data needs including:

1. Research (SARDI),
2. Compliance (PIRSA),
3. EPBC Act (DEH)
4. Industry Clean Green program (Southern Rocklobster Limited (SRL))
5. Market including full product traceability (SRL)

Over a number of years the FMC and industry have been working with PIRSA Fisheries to investigate the feasibility of integrated electronic monitoring and recording of the lobster catch. In doing so the objectives of the FMC in the long term have been to maintain:

- Integrity in the quota system,
- Accurate weighing of the catch,
- Accountability of the catch weights,
- Verification of the catch weights,
- Observation of landing and weighing procedure,
- Security of the equipment and guaranteed confidentiality of individual data and images, and

- Cost-effective quota monitoring.

In 2002 electronic weighing of the catch was successfully trialled in Beachport using electronic scales and individually tagged bins. The catch weight in each bin was automatically established by the scales, recorded against the individual's quota and transferred electronically to PIRSA.

Following this the FMC further explored electronic weighing and monitoring options, and by 2004 it was apparent that integration of the electronic weighing process and video monitoring using shared infrastructure was possible.

In 2004 an independent consultancy established the broad scope for the establishment and operation of an integrated catch weighing and video monitoring system.

In the 2005-06 season a stand alone system of video monitoring was trialled at Robe. The trial involved video coverage of the port, dock area and weighing process. The video recording occurred 24 hours/day all season and images were viewed remotely by the compliance group.

2.1 Objective

The FMC wishes to establish at each of 7 ports an integrated system for electronically weighing the lobster catch and transferring the information to PIRSA Fisheries catch recording database (FLAMS).

As well, the FMC wishes to establish capacity to link the weight data to video vision of the weighing process at the same location.

The port locations are Cape Jaffa, Robe, Beachport, South End, Carpenters Rocks, Blackfellows Caves and Port MacDonnell.

Capacity is to be established to transfer the data from the weighing and video processes in real time to PIRSA Fisheries Compliance in Mount Gambier via broad band, wireless and/or other suitable technology by site.

The system is to be fully operational by 22nd September 2006.

2.2 Purpose

The purpose of this document is to provide the scope of Integrated Electronic Catch Weighing and Video Monitoring System. The scope is described in 2 key sections of

the integrated system namely video and electronic weighing, which can be delivered as either a single contract or separate contracts for each section.

2.3 Project Management

The project is to be managed by PIRSA Fisheries and the FRDC.

The contract will be with the FRDC and payments will be made to the contractor by the FRDC.

3. SECTION 1 - VIDEO COMPOENT

3.1 Scope

The video component of the integrated system includes:

1. Remote video surveillance and recording systems each complete with a minimum three (3) cameras, brackets and associated wiring and connections at 6 weighing stations located in Cape Jaffa, Beachport, South End, Carpenters Rocks, Blackfellows Caves and Port MacDonnell.
2. Colourbond weatherproof structures to house the recording equipment.
3. Establishment of power and telephone to each location.
4. Centralised monitoring of remote weighing stations
5. Training in the use of each system.
6. Backup and maintenance.

It should be noted that a system is already established at Robe and this will be required to be linked to the additional sites.

3.2 ON SITE CAMERAS

Very high quality mastered images are required to be produced and maintained for analysis. Minimum camera requirements are:

- shock resistant with the body make
- IP66 Rated
- be mounted to minimise theft or tampering

Each site will have a minimum equivalent of 3 fixed vandal and weatherproof cameras as follows:

- Inside weigh station front on shot – Samsung dome camera SCC-931 TP
- Bay area - Sony Day/Night Camera SCC- E473P
- General weigh station area - Sony Day/Night Camera SCC- E473P

At Pt MacDonnell two additional cameras (Sony Day/Night Camera SCC- E473P) and 2 wireless transmitters/receivers are to be located at the eastern jetty.

External cameras equivalent specifications must:

- have built-in Super Dynamic II technology (wide dynamic range) to handle extreme scene light variations;
- be 1/3-type double speed CbCD colour image sensor;
- have high sensitivity minimum scene illumination of 0.8lx at colour imaging mode;
- be 1/3" CCD pick-up element with 752 (H) x 582 (V) pixels (480 lines horizontal resolution);

- provide 50dB of signal-to-noise ratio or better;
- accept VD2 signal for synchronization of all cameras;
- have electronic shutter speed from 1/50 (off) to 1/ 10,000sec;
- have Linear electronic sensitivity (up to 32 times);
- have built-in digital motion detector;
- have built-in alphanumeric character display;
- have built-in On-screen set-up menu;
- have gen-lock capability for the large system application;
- in built auto iris variable 3.8mm-8 mm lens.

3.3 VISUAL SITE RECORDING/MONITORING

Images will be maintained on site on a DVR and be downloaded on an as needs basis. Minimum equivalent features required are:

- Automatic event recording activated by movement
- Intelligent search capability based on time events or activity
- Automatic dial up to monitoring station

The AFT5005 -160gb (or equivalent) up to 6 camera remote access DVR is specified to provide a picture of each 6 cameras for 4 months in a CIF Quality image.

Given that ADSL connection is not available at all 7 sites the system is initially to use the conditional refresh rate technology - Vision Systems ADPRO Fastrace (or equivalent). Set up to include all telephone connection costs.

3.4 VISUAL SITE MONITORING (Mt Gambier)

Central monitoring of remote weighing stations is a key feature of the system and it will provide operators, PIRSA Compliance Unit (PCU), with the facility to remotely visually observe the weighing process in real time and undertake audits from stored recordings. Minimum features required are:

- Remote set up of on site DVRS (change settings within the DVR)
- Automatic or operator selectable storage and
- Database search

Video Central Gold software (or equivalent) is to be loaded on a suitable PIRSA Compliance Unit PC and modem and linked to the 7 remote sites.

3.5 POWER SUPPLIES

The video contractor will establish connection of equipment to 240vAC power which shall be single connection only, i.e., pig backing of plugs and plug-packs shall not be accepted. Power is to be provided using same main phases and supplies shall be

fitted with front panel mounted fuse to 240 Volt supply, and have individually fused power outputs.

Power equipment shall be installed to comply with the appropriate Australian Standards and regulations.

Please note that power is currently not available at the remote sites and access will need to be determined as part of the project.

3.6 CABLING

The contractor will supply, install, connect, and terminate all cabling necessary to complete the system installation, including all power distribution, security device, data, control and communications cabling.

All terminated cabling shall be neatly tied and loomed to prevent damage to terminations, and avoid obstruction of other services and/or devices and no joints or connections in cables shall be permitted.

When calculating cable sizes consideration to voltage drop must be given and the cost of withdrawing and replacing incorrect cable shall be at the Contractor's expense. Also cables must be installed in a manner eliminating any strain on the cable, or on cable terminations, and with allowance made for additional cable length to be installed at the equipment for removal for inspection, adjustment or replacement.

Where equipment supplied and installed requires special cabling (i.e. screened cables, unscreened twisted pair, or other special types of cable), allowance shall be made to provide as required.

Connection of all equipment shall be designed not to cause interference with radio, television or other electrical equipment in the same locality and care shall be given to supply and install a true electronic ground for all equipment, at all locations, to minimise earth loops and/or electrical noise.

3.7 REMOTE ON SITE EQUIPMENT

To maximise the life time of the remote monitoring equipment and protect the equipment from tamper and weather use of existing buildings to house the equipment will be preferable.

Location of equipment will be determined in consultation with the PIRSA project team and the port FMC representative at each site.

3.8 CAMERA LOCATIONS MOUNTINGS & FITTINGS

A general understanding of the port and the location of the cameras should be established by the contractor. However, the final physical pin-pointed placement of cameras and camera focusing/ptz adjustments will be done with consultation with PIRSA Fisheries. All mounting brackets/fixings are to be supplied by the contractor.

Any and all terms of any Council, Department of Transport and/or other Development approvals must be met by the contractor. Costs of changes due to non-observance of approval conditions will be borne by the contractor.

Approval in writing from the PIRSA Fisheries must be sought prior to installation.

3.9 Other comments

Equipment to be weatherproof and tamperproof.

The video contractor will coordinate all installation activities with the selected electronic scales contractor.

4. SECTION 2 - ELECTRONIC SCALES

4.1 scope

Software and hardware is to be established that will create the following data – secure and legally accepted record of:

i. registered master identity
ii. registered port of landing
iii. port of landing
iv. date,
v. time,
vi. bin numbers,
vii. number of lobster
viii. net weight of lobster,
ix. licence number.

The licence holder is to be identified at the commencement of the weighing using an eye button and pin number.

Bins will be individually securely identified and catch weight net of each bin weight (they vary by brand) is to be established and recorded at weighing.

The system will record the net weight of lobster and record (deduct) this from the balance from the previous day for each of the 180 licence holders.

Weight by bin and total of all bins will be displayed/printed.

The licence holder will enter the number of lobster and confirm each bin weight manually. At the end of weighing the total weight is to be displayed and confirmed by licence holder manually. If the weight is unconfirmed the process is to be cancelled ready for the next weighing.

The total individual quota remaining before the weighing and at the end of the weighing for each licence holder will be displayed/printed.

Weight data will be stored and retrieved via remote access with capacity to automatically download at predetermined times. It will allow access for reviewing remotely 24/7 in real time.

Thermal printer to print bin weights and totals, and transaction details are to be recorded on the video image.

Capacity to deal with other species i.e. initially giant crab and/or other species through the same process is to be established.

The capacity to lodge Part A data of the current catch disposal record electronically from remote locations into the database is to be established.

Protocols are to be established for:

- dealing with replacement eye button and bin tags and
- manual weighing and paper record using the current CDR process should the system fail

4.2 Equipment

The following equipment is to be established:

1. Scale (**existing scales to be upgraded and used where possible)**
2. Indicator with stainless housing
3. Waterproof electronic bin tags each with a visual number (approximately 3000 to be confirmed)
4. Tag reader
5. Data storage and retrieval unit
6. Additional outputs – video and data storage
7. Backup UPS power

4.3 TRAINING

Training of 180 licence holders, skippers and their crew will be provided by the contractor in each of the seven ports on a group session basis. The contractor will work in conjunction with PIRSA fisheries who will arrange the training sessions.

This will be supported by a communication program conducted by PIRSA Fisheries.

4.4 Other comments

Equipment to be weatherproof and tamperproof.

The electronic scales contractor will coordinate all installation activities with the selected video contractor.

5. SECTION 3 – GENERAL BOTH CONTRACTS

The following are to be dealt with by all contractors.

5.1 DOCUMENTATION

The contractor shall provide two copies of equipment operating manuals, installation and connection manuals, and “As Connected” documentation to PIRSA Fisheries in electronic format for approval before practical completion is granted.

The system documentation/manuals shall include schematic diagram showing equipment and interconnection details.

Warranty information is to be supplied on practical completion.

5.2 TRAINING

Training of up to 4 system operators shall be conducted to the satisfaction of PIRSA Fisheries before practical completion is issued. Training must cover all aspects for the correct operation of the system.

Person/s with a comprehensive knowledge of the system supplied shall perform the training, for at least three two-hour on-site training session for the nominated PIRSA.

5.3 SYSTEM SUPPORT AND MAINATENCE

System maintenance and operator support are to be supplied by the contractor and the system must be maintained fully operational 24 hours each day and 7 days each week for the duration of the 8 months season. from October 1st – May 31st.

A fixed charge is to be specified for system maintenance and operator support for 2006-07 and an indicative cost for year 2 onwards.

Provision for adequate storage and security is to be provided for the equipment and system outside the season.

5.4 REPORTING

The contractor will provide a monthly written report covering at least system functioning, operational issues, system failure and suggestions for modifications.

A final report will be provided no later than 2 weeks after the end of the season. For day to day issues the contractor will only take direction from PIRSA Fisheries nominated representative.

5.5 TIMELINES

The system is to be fully operational and training completed in all ports by September 20th 2006.

This timeline assumes appointment of the contractor no later than August 4th 2006.

Should appointment occur later than this, then the completion date will be adjusted accordingly.

5.6 CONTRACTOR SELECTION CRITERIA

The following criteria will be used to select the contractor:

1. Previous experience – please provide details of relevant projects with the client referee contact details.
2. Project personal – qualifications and experience of person(s) that will undertake the work.
3. Business proximity to operational sites.
4. Business capacity to deliver:
   (1) please provide a detailed work plan i.e. timeline, activities and resources to set up the system and deliver training on time and
   (2) please provide detail of maintenance and support capacity and plans.
5. Price

5.7 INSUARNCE

Adequate public liability and indemnity insurances to be held and evidence is to be provided.

5.8 QUOTATION

The contractor is to provide a detailed quotation in the following format for each of the 7 port locations and the PIRSA Mount Gambier Office:

Item	**Ports 1-7 and Mt Gambier**	**Other Non location specific costs**
Equipment		
Set up		
Software and installation		
Power – provision		
Training costs		
Maintenance and operator support – 2006-07		

Maintenance and operator support – 2007-08 onwards (indicative only)		
Other – please provide detail		

Notes: Price quoted is to be exclusive of GST.

5.9 MILESTONES AND PAYMENT SCHEDULE

Video

Date	Milestone	Payment
August 7th	Contract Signed	30%
September 1st	Video established 3 ports	30%
September 22nd	Practical completion - set up, fully functional and training completed	30%
October 31st	1 month of successful operation and support	Balance less monthly provision for maintenance and support

Electronic Scales

Date	Milestone	Payment
August 7th	Contract Signed	30%
September 1st	Scales established 3 ports	20%
September 22nd	Scales established 7 ports. Full weighing and recording functionality at the port. Training completed.	20%
November 30th	Central software, data base and data transfer component completed. Complete system functionality achieved	20%
January 1st	1 month of successful operation and support	Balance less monthly provision for maintenance and support

5.10 OTHER conditions

PIRSA is not bound to accept the lowest priced or any offer and the request for a quote does not constitute a Purchase Order or any type of offer capable of acceptance.

No contract will necessarily result from the submissions of any offer and PIRSA may elect not to consider any offer that does not comply with these conditions or include all the information called for, or is in any way incomplete.

PIRSA reserves the right to:

- extend the closing date
- amend the requirements at any time prior to the closing date of the offer, provided that the amendment is notified to prospective bidders;
- abandon this process whether before or after the receipt of offers;
- invite any person to submit a offer;
- accept a portion of the whole of any offer at the price or prices offered, unless the offer states specifically to the contrary;
- consider or accept any offer including without limitation a late offer or the offer of a bidder who has failed to submit an offer in accordance with these Conditions.

The offer is to remain open for acceptance or rejection for a minimum period of 30 days from Closing Date of offer, unless otherwise stated.

In all cases where a price, which is subject to variation, is accepted, PIRSA reserves the right, in the event of any variation to the contract price, to check any rise or fall in wage and/or material, and other costs occurring subsequent to the date of quoting, and to decline to make any payment claimed until satisfied that the such variation to the contract price is justified by a rise or fall in either wage, material or other costs.

5.11 AGREEMENT

Upon notification that the Supplier’s offer has been accepted, the Supplier will be required to enter into an agreement with the Fisheries Research and Development Corporation. The Supplier shall provide the service(s) in accordance with the terms and conditions of that contract.

APPENDIX 5 EXTENSION PLAN

EXTENSION PLAN

"Integrated Electronic Catch Weighing and Video Monitoring System"

South Australian Southern Zone Rocklobster Fishery

26th July 2006

FRDC Project Number 2006/234

Prepared by CORVEL Marketing and Management
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CONTENTS

1. BACKGROUND

The South Australian Southern Zone rocklobster Industry supports accurate recording of catches to ensure sustainability of the stock. Licence holders currently weigh their catch on arrival at their respective ports, recording it on a paper catch disposal record (CDR).

Electronic Catch Monitoring (ECM) is electronic verification of catch disposal records at the time of weighing integrated with video recording of the landing and weighing activity.

Industry has developed the initiative in partnership with the Fishery Management Committee (FMC), PIRSA and FRDC.

Over a number of years the FMC and industry have been working with PIRSA Fisheries to investigate the feasibility of integrated electronic monitoring and recording of the lobster catch. In 2002 electronic weighing of the catch was successfully trialled in Beachport using electronic scales and individually tagged bins. The catch weight in each bin was automatically established by the scales, recorded against the individual's quota and transferred to PIRSA.
9
In the 2005-06 season a stand alone system of video monitoring was trialled at Robe. The trial involved video coverage of the port, dock area and weighing process. The video recording occurs 24 hours/day all season and images can be viewed remotely by the compliance group.

This project will develop and design the infrastructure and system for integrated electronic data collection at the wharf, data transfer and centralised management of catch weighing and monitoring data. The system developed will be implemented in the 7 ports of landings.

Licence holders will be the end users and beneficiaries of the project outcomes and a critical risk identified is the system complexity which could prevent successful implementation with licence holders and their crew.

An extension program to licence holders is required to ensure effective implementation of the ECM.

2. OBJECTIVES

The objective if the program is to:

1. Communicate the ECM system features and benefits to each licence holder at least 5 times prior to October 1 2006.
2. Maintain and increase positive awareness of ECM.
3. Have 100% licence holders understanding the ECM system, in possession of necessary equipment and capable of using the system by October 1 2006.
4. Provide ongoing support information about using the system from October 1st 2006 – May 2007.

3. TARGET AUDIENCES

The target audiences are:

1. Licence holders and crew responsible for weighing catch.
2. Wider local community.

4. EXTENSION STRATEGY

The extension strategy will have 4 elements namely:

1. Enlisting licence holders who are early adopters of innovation and/or key influencers who initiate and/or lead changes in the industry, as the 'ECM Captains' or champions and information points for the introduction of the system.

2. Communicating the features and benefits of ECM at least 4 times to every licence holder via a range of communication media including the 'ECM Captains

3. Training all participants in system use by October 1.

4. Establishing support in season by telephone.

5. KEY MESSAGES

The key message to extension targets are as follows:

Messages	**Targets**
1. ECM will save you money and time. - The set up cost is one off. - The reduction in licence fees will be greater than the cost. - It does the paperwork for you.	1. Licence holders & crew
2. ECM is an industry initiative - Has widespread support from licence holders.	1. Licence holders & crew 2. Local community
3. ECM is about protecting the stock and your business - Demonstrates your commitment to protecting the stock - is an investment in protecting your profits and licence values - allows you to show you are honest - exposes dishonest behaviour	1. Licence holders & crew 2. Local community
4. ECM is simple - Industry trials were successful - Eye button & pin number - Tagged bins - Key pad - Current system	1. Licence holders & crew
5. Everyone must be involved - It will replace the compulsory CDR - To capture the savings it needs to work for all	1. Licence holders & crew

6. METHODS

The program is divided into 2 time periods namely pre-seasonal and within the season.

The pre- season activities are focused on equipping all licence holders and those that weigh lobster with the equipment (eye button & electronically tagged bins) and skills to operate the system.

The within season activity is focused on providing on the spot support when individuals experience difficulties in using the system through either operator errors and/or equipment failure.

A range of extension tools and activities will be involved in the program as follows:

Produce Extension material

1. **Background paper** - covers overview of the program preliminary scope and features and benefits
2. **Media release** – announces program
3. **Fact sheet** – covers licence holder information for involvement and features and benefits
4. **Tags request form** – covers tag numbers needed for each licence and brief features and benefits.
5. **Notice 1 - Training days** – time and location and brief features and benefits
6. **Scale Instructions** – “how to” use the scales guide
7. **Notice 2** - “what to do” and “where to get help” when system is not working
8. **Notice 3** – “its coming” call if help needed and brief features and benefits

Individual Direct Communication

1. Fax and telephone communications with licence holders as follows: gathering data on the number of bin tags required, training days flyers, fact sheet – questions and answers, time lines, features and benefits
2. Post background paper of the proposed system, costs and benefits background to all licence holders
3. Request for bin numbers to all licence holders including brief overview
4. Distribute Newsletter
5. Port meeting presentations
6. Telephone email communication with service providers and Government.
7. One on one support at scales and by telephone

Industry Extension Events

1. Link into SEPFA (zone peak body) – attend meetings
2. Link into port associations (7 local ports) attend meetings & fax

communications
3. Phone contact with port leaders to gain commitment.
4. In port activities – bin tagging days and weighing, system training all licence holders.

Media Interaction

1. Media releases to outlets as well as industry networks and association
2. Utilise industry referees as needed.
3. Distribution of newsletter to media including radio, television and magazines.
4. Participate in interviews as requested.

8. ACTION PLAN

The action plan is structured to develop extension materials and then undertake extension activities untilising the materials aimed at the target audience.

1. ECM Port leaders
Activity 1 – telephone and provide initial information about the project. Seek commitment to support and lead the introduction. Target 7 ports by September.

Activity 2 – establish port meeting schedule and undertake meetings. Target 7 ports by October 1.

2. All licence holders – Skippers & Crew.
Activities - Circular 1. Introduce the ECM monitoring concept – features and benefits. Target all licence by early July.

Activity - Circular 2. Update on implementation progress. Target al licence holders by mid August.

Activity 3 - Circular 3. Progress update and training dates. Target all licence holders by early September.

Activity 4 - Flyer – “how to” use system. Post, & fax/email network. Distribute just prior and at training days. Target all licence holders mid September.

Activity 5 - Training days. Train at the ports in system use. Set up bins. Target all licence holders by October 1.

3. Port Instruction notice.
Activity 1 – develop notice and post in all ports. Target 7 ports by October 1.

4. One on one at scale support.

Activity 1 - Information on weighing procedure. Week 1 of season. Target all licence holders ongoing.

5. Telephone support.

Activity 1 – provide information on weighing procedure. Target all licence holders ongoing. October 1 onwards. PIRSA compliance group

6. Wider industry/community

Activity 1 - Media release 1 to SRL Newsletter & fax/email network include program details including FMC testimonials. Target wider community by July and ongoing.

Activity 2 - Media release 2 to SRL newsletter & fax/email network. Progress on implementation & announcing training including industry testimonials. Target wider community and industry by late September.

The principal investigator will implement the extension program. He was trained to tertiary level in extension and has over 25 years experience in designing and implementing extension programs.

9. EXTENSION TIMETABLE

Produce Extension Materials	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**
Newsletters	**X**		**X**									
Notices 1-3	**X**	**X**	**X**									
Flyers – fact sheet, tag request & instructions		**X**	**X**									
Individual Direct Communication	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**
Port Leaders – phone communication	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Distribute Circulars 1-3		**X**	**X X**									
Distribute Newsletter		**X**		**X**								
Port Meetings – Tas												
Port Meetings – Vic												
System Feed back				Data collection ongoing								
Evaluation								**X**	**X**	**X**		
Extension events	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**
Port Meetings			**X**	**X**								
Link to Port Associations	**X**	**X**	**X**	**X**	**X**							
Bin Tagging			**7 ports**									
Media	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**
Newsletters	**X**		**X**									
Evaluation consultancy							**X**	**X**	**X**			

10 EVALUATION

The Program will be evaluated as follows:

- % industry uptake of the system
- Number of licence holders unsuccessfully using the system
- Feedback from users, service providers
- Independent Consultancy review

APPENDIX 6 EXTENSION MATERIALS

SOUTHERN ZONE ROCK LOBSTER

FISHERY MANAGEMENT COMMITTEE

Committee Support Officer: James Teale
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ADELAIDE SA 5001
Ph: 8463 3334
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12th May 2006

All Southern Zone Licence Holders

Re: Implementation of Integrated Electronic Weighing, Catch recording and Video Monitoring of Weighing System – all Ports 2006-07 Season

Dear licence holder

I am writing to brief you on developments with the compliance arrangements in the fishery. As you know the arrangements for 2005-06 were transitional from dockside monitors to an alternative program with a new mix of resources and activities.

The FMC is now in a position to support a long term arrangement involving electronic scales and video monitoring and the following is provided for your information. I encourage you to consider the information carefully and follow up with any questions or feedback that you may have.

Background:
Over a number of years the FMC has been working with PIRSA Fisheries to investigate the feasibility of integrated electronic monitoring and recording of the lobster catch. In doing so the objectives of the FMC in the long term have been to maintain:

a. Integrity in the quota system,
b. Accurate weighing of the catch,
c. Accountability of the catch weights,
d. Verification of the catch weights,
e. Observation of landing and weighing procedure,

f. Security of the equipment and guaranteed confidentiality of individual data and images, and

g. Cost-effective quota monitoring.

In 2002 electronic weighing of the catch was successfully trialled in Beachport using electronic scales and individually tagged bins. The catch weight in each bin was automatically established by the scales, recorded against the individual's quota and transferred to PIRSA. The system was not implemented at that time as the cost was deemed prohibitive.

Following this the FMC compliance subcommittee further explored electronic weighing and monitoring options, and by 2004 it was apparent that integration of the electronic weighing process and video monitoring using shared infrastructure could be cost effective.

In 2004 an independent consultancy by REXEL established the technical specifications for the establishment and operation of an integrated catch weighing and video monitoring system.

In the 2005-06 season a stand alone system of video monitoring was trialled at Robe. The trial involved video coverage of the port, dock area and weighing process. The video recording occurs 24 hours/day all season and images can be viewed remotely by the compliance group.

In late 2005 into early 2006, an independent review of the Robe video trial was conducted by Warner and Associates (a copy of the review was circulated to all licence holders in April).

Warner and Associates assessed the video trial in terms of deterrent value, use in intelligence gathering and use as evidence. The independent report concluded among other things **"…there will be enormous benefit as a tool to assist with compliance practices."**

System Costs

Indicative costs have been sourced from suppliers based broadly on the preliminary system specifications shown in Appendix 1 (scales) and Appendix 2 (video monitoring). The **estimated** cost as a once off to set up the integrated electronic system is as follows:

1. Video including installation - $45,000 per site for 6 sites $270,000 (note Robe system exists)
2. Scales including programming excluding installation - $18,000 for 7 sites $126,000
3. Electronic scales installation assuming part included in video – $2,000 at 7 sites at $14,000
4. Backup and maintenance allow $10,000

Therefore the **estimated** once off set up cost for the fully integrated system is $420,000 or $2,330 per licence.

An allowance for equipment replacement and ongoing maintenance will also be required in the long term.

System Savings

If the system proves to operate effectively, PIRSA has agreed to reduce the compliance officer days by 200 in season 07/08 onwards. The Director of Fisheries will provide this commitment in writing to the FMC.

A reduction in compliance officer days of 200 at the current cost will represent a licence fee saving of $174,000 per annum or $965/licence per annum from 2007-08 onwards.

Next Steps

Based on the various trials, the Warner report and the long term savings against the once off start up cost, the FMC has agreed to move to implement an integrated electronic monitoring and recording of catch weighing system in all ports for the 2006-07 season.

The following has been recommended to the Minister:

That $420,000 is provisioned in the licence fee for implementation of an integrated electronic (video) monitoring and recording of the lobster catch weighing system.

This is a substantial once off amount which would represent approximately a 16% increase in licence fee. In light of this, the industry members of the FMC have requested that the Government be approached to explore the options for cash flow support for the project over 3 years. Naturally an appropriate repayment (interest and capital) would need to be established through the licence fee.

Should the Minister accept the recommendation, tenders would then be called to supply the equipment and install it prior to the 2006-07 season and to maintain the system throughout the season.

Should cash flow support through the Government not be available, you should expect a once off licence fee increase of about $2,330 for 2006-07.

From 2007-08 onwards, assuming the system is successfully implemented, you can expect your licence fee to reduce by the once off increase of **$2,330 and a further estimated $965 from the system savings.**

It should be noted that the current CDR system would be run in parallel at least until confidence exists that the electronic system is operating effectively.

Prior to the season PIRSA and the FMC in conjunction with the service provider, will provide assistance and training in how to use the new system. The FMC, PIRSA Fisheries and SARDI Aquatic Sciences are also planning to hold an industry workshop in Millicent on 23 June to cover a whole range of issues. There will be more information circulated to all licence holders on this soon.

Feedback

While the FMC has formed its position on the system, your comments will be appreciated. If you have any concerns about the proposal or suggestions to improve the concept further, please contact the Extension Officer on 8272 7766 or fax comments to 8272 7767.

Yours sincerely

Catherine Cooper
Chair
Southern Zone Rock Lobster FMC

Appendix 1

Southern Zone Rocklobster Fishery
Integrated Electronic Weighing and Catch Monitoring System
Preliminary Scope of Program

March 28, 2006

2. Purpose:

The purpose of this document is to provide an indication of scope of a proposed Integrated Electronic Weighing system.

It should be noted this is preliminary and final decisions will be made prior to implementing the system.

3. Project Objective

The FMC wishes to establish at each of 7 ports an integrated system for electronically weighing the lobster catch and transferring the information to PIRSA Fisheries catch recording database (FLAMS).

As well, the FMC wishes to establish capacity to link the weight data to video vision of the weighing process at the same location.

Capacity is to be established to transfer the data from the weighing and video processes in real time to PIRSA Fisheries Compliance in Mount Gambier via broad band, wireless and/or other suitable technology by site.

4. Scope

a. Electronic process will create the following data – secure and legally accepted record of:
    i. registered master identity,
    ii. date,
    iii. time,
    iv. bin numbers,
    v. net weight of lobster,
    vi. licence number.
b. The licence holder is to be identified at the commencement of the weighing using for example a swipe card, eye button (preferred) etc.

c. Bins will be individually securely identified to the individual and catch weight net of each bin weight (they vary by brand) is to be established and recorded at weighing.
d. The system will record the net weight of lobster and record (deduct) this from the balance from the previous day for the 180 licence holders.
e. Weight by bin and total of all bins will be displayed/printed
f. The total individual quota remaining before the weighing and at the end of the weighing for each licence holder will be displayed/printed.
g. End of weighing the total weight is to be displayed and confirmed by licence holder manually.
h. If the weight is unconfirmed the process is to be cancelled ready for the next weighing.
i. Weight data will be stored and retrieved via remote access with capacity to automatically download at predetermined times. It will allow access for reviewing remotely 24/7 in real time.
j. Thermal printer to print weight.
k. Weight to be recorded on video image.
l. Capacity to weigh giant crab and/or other species through the same process.

5. Equipment/software

8. Scale
9. Indicator with stainless housing
10. Waterproof bin tags
11. Tag reader
12. Data storage and retrieval unit
13. Additional outputs – video and data storage
14. Backup UPS power

6. Other comments

Other considerations - equipment to be weatherproof and tamperproof.

Appendix 2

Southern Zone Rock Lobster Fishery

Catch Weighing Video Monitoring System

Preliminary Scope of Program

7. Purpose:

The purpose of this document is to provide an indication of scope of a proposed Integrated Catch Weighing Video Monitoring System.

It should be noted this is preliminary and final decisions will be made prior to implementing the system.

8. Project Objective

The FMC wishes to establish at each of 7 ports an integrated system for video monitoring weighing lobster catch and transferring the information to PIRSA Fisheries compliance unit.

As well, the FMC wishes to establish capacity to link electronic weight data to video vision of the weighing process at the same location.

Capacity is to be established to for remote real time monitoring and observation of the landings and weighing procedure by PIRSA Fisheries Compliance in Mount Gambier via broadband, wireless and/or other suitable technology by site.

9. Scope

a. ON SITE CAMERAS

Very high quality mastered images will be produced for real time monitoring via a base station and be stored over the full season for future analysis. Minimum camera requirements are shock resistant with the body make, IP66 Rated and mounted to minimise theft or tampering.

Each site will have 3 fixed cameras and 1 Vandal resistant Pan Tilt Zoom camera as follows:

- Above weigh scales overhead shot
- Side of weigh station side shot
- Inside weigh station front on shot
- Bay area and weigh station

External cameras will have:

- Capacity to handle extreme scene light variations;
- a colour image sensor;
- high sensitivity minimum scene illumination and
- a built-in digital motion detector.

b. VISUAL SITE RECORDING/MONITORING

Images will be maintained on site on a Digital Video Recorder (DVR) and be downloaded in real time or on an as needs basis. Minimum features will be:

- Automatic event recording activated by movement 24 hours/day 7 days/week for the full season,
- Intelligent search capability based on time events or activity, and
- Audio interface for two way audio communication (optional).

c. REAL TIME VISUAL SITE MONITORING

Central monitoring of remote weighing stations is a key feature of the system. The system will provide the PIRSA Compliance Unit (PCU) with the capacity to remotely visually observe the weighing process in real time and undertake audits from stored recordings. Capacity will exist to monitor all 7 sites simultaneously.

Minimum features will be:

- Real time visual access to port activities from a base station (24/7);
- Remote set up of on site DVRS (change settings within the DVR);
- Automatic or operator selectable storage;
- Remote control of Pan/Tilt Zoom cameras; and
- Database search.

d. CAMERA LOCATIONS MOUNTINGS & FITTINGS

A general understanding of the port and the location of the cameras will be established by the contractor. However, the final physical pin-pointed placement of cameras will be done with consultation with PIRSA Fisheries.

Southern Zone Rocklobster Industry Seminar Presentation

June 23rd 2006

Integrated Electronic Monitoring and Recording of Catch

What is it?
A system in each of the 7 ports of

- Electronic scales
- Video surveillance
- Integrated using one set of cabling and housing
- weighing and video images available to compliance in real time and a permanent record for review.
- Replace the paper

What are we trying to achieve?

- Integrity in the quota system,
- Accurate weighing of the catch,
- Accountability of the catch weights,
- Verification of the catch weights,
- Observation of landing and weighing procedure,
- Security of the equipment and
- guaranteed confidentiality of individual data and images, and
- Cost-effective quota monitoring.

How have we developed it?

1. 2002 electronic weighing of the catch trialed in Beachport: electronic scales and individually tagged bins
2. 2004 independent consultancy by REXEL established scope for integrated weighing and video system
3. 2005-06 season a stand alone system of video monitoring trialed at Robe.
4. 2006 Warner and Associates independent report on video concluded "…***there will be enormous benefit as a tool to assist with compliance practices***."

What will it do?

- Remote real time observation of landing and weighing process in the 7 ports 24 hours/day 7 days per week established
- Real time video and digital recording of weights
- New deterrent factor introduced to the compliance program
- Reduced compliance officer on site time observing weighing process and

- Reduced CDR collection, handling and data processing costs.

Extra value adds?

- Electronic platform for recording and transfer of a range of additional data in the future – e.g. research, industry and market.
- Additional port security – vandalism, vessel tampering, theft etc
- Capacity for remote real time observation of recreational fishing and landing activities at 7 ports 24 hours/day 7 days per week.

Costs and Savings

Cost:
1. Set up $420,000 or $2,330 per licence.
2. $20,000 (estimate) pa backup

Savings:
3. Compliance costs $174,000 pa $965/licence per annum

Next Steps
5. Finalise technical specifications and service providers – look at previous work and other national projects.
6. Establish equipment and installation acquisition process
7. Manage the Contractors to install by October
8. Prepare all licence holders – bins, system use prior to the season
9. Mid-season independent review the system effectiveness
10. End of season FMC evaluation and fine tuning

Bin Tagging All Licence Holders

All Bins to be used in 2006-07 Season Must Be Tagged

PIRSA Compliance will be certifying the weight of all bins for the coming season as part of introducing electronic scales.

When & Where?

Meet at scales area (except Kingston).
If weather prohibits this, we will organise a nearby sheltered area.

Port MacDonnell

Pt Mac licence holders (S003 to S063)	10am - 12pm **Tuesday 12th September**
Pt Mac licence holders (S065 to S119)	12pm - 2pm **Tuesday 12th September**
Pt Mac licence holders (S120 to S165)	10am - 12pm **Wednesday 13th September**
Pt Mac licence holders (S166 to S243)	12pm – 2pm **Wednesday 13th September**

Carpenters Rocks 10am - 12pm **Thursday 14th September**
Robe 10am - 1pm Friday **15th September**
Kingston/Cape Jaffa 10am - 1pm **Monday 18th September (Fisheries Depot - Kingston)**
Beachport 10am - 12pm **Tuesday 19th September**
Southend 2pm - 4pm **Tuesday 19th September**

Checklist to bring:

1. All bins and lids/covers to be used season 06/07
2. Rivet gun
3. Cordless drill
4. Crew that will be weighing catch

Questions?

Call Hamish Telfer 0409 696 500 or Roger Edwards 0418 806 103

For support call CONTROL CORP 0427018137 FISHWATCH 1800 065 522

SOUTHERN ZONE
ROCKLOBSTER FISHERY
Electronic Catch Weighing Procedure

SA ROCK LOBSTER INDUSTRY

Step	Look for this screen message before the next step	When you see the message, what do you do?
1. Arrive At Scales: Insert I-Button	Mobile Unit Insert i-Button to BEGIN	Insert i-Button in top black slot
2. Enter Pin	ENTER PIN	Enter Your Pin Number and press ENTER
3. Weigh lobster bins	PLACE BIN ON SCALE - Tag to Rear (Top of Screen)	Position 1 bin with tag facing rear at back – wait for Confirm Weight message
4. Confirm bin weight	Confirm Weight (Top of Screen)	Press OK
5. Remove bin	Weighing of BIN complete - Remove (Top of Screen)	Remove Bin place next bin on scale or finish
6. Switch to Giant Crab weighing	Next Bin or DONE (Top of Screen)	Press WEIGHING LOBSTER
7. Weigh Giant Crab bins	Place bin on scale – Tag to Rear (Top of Screen) WEIGHING (Bottom left of Screen) CRAB	Follow same procedure steps 4-5.
8. Finish Weighing all bins	Next Bin or DONE (Top of Screen) DONE (Bottom right of screen)	Press DONE
9. Final Check Weights & Bins	LOBSTER CRABS VALUES ARE CORRECT	Check bin numbers and weight are correct If incorrect Remove i-*button* and start again. If correct - press VALUES ARE CORRECT
10. Quota Report	Print out will show weight and quota remaining	Tear off print out
11. EXIT SYSTEM	REMOVE i-BUTTON TO EXIT	Remove i-button

HELP & IMPORTANT INFORMATION

1. UNTIL NOTIFIED CONTINUE TO COMPLETE A PAPER CDR ACCURATELY AND POST IN THE CDR BOX AS PER PREVIOUS SEASONS.

2. REMOVE YOUR i-BUTTON AT ANY TIME PRIOR TO PRESSING VALUES ARE CORRECT AND YOUR WEIGHING WILL BE CANCELLED.

3. DO NOT PRESS VALUES ARE CORRECT IF YOU HAVE MISSED A BIN OR ARE UNCERTAIN ABOUT ANYTHING. THE WEIGHT WILL BE TAKEN FROM YOUR QUOTA. REMOVE i-BUTTON AND START AGAIN.

4. SYSTEM NOT WORKING:

- **Check issues below**
- **Call Control Corp support 0427018137**
- **Contact FISHWATCH 1800 065 522**
- **Still not working – weigh manually and lodge CDR.**

5. DO NOT PUT BINS IN THE FREEZER – TAGS WILL MALFUNCTION
6. WEIGH 1 BIN AT A TIME
7. GIANT CRABS MUST BE PLACED IN A REGISTERED BIN FOR WEIGHING
8. NEED EXTRA BIN TAGS OR i-BUTTONS – CALL FISHWATCH 1800 065 522

WEIGHING PROBLEMS

Issue	Look for these Messages before the next step	What Do You Do?
1. Screen Blank	Insert i-Button to BEGIN	Tap screen
2. Incorrect Pin	Wrong Pin	Press ENTER and enter pin again
3. Wrong Position	Looking for BIN - Reposition	Move Bin nearer reader and/or left/right
4. Bin weighed twice	REMOVE BIN	Remove bin
5. Missed a bin		Repeat weighing process steps 3-10 above
6. Final Check –weights and bin numbers incorrect	VALUES ARE CORRECT	REMOVE i-BUTTON AND START AGAIN DO NOT PRESS VALUES ARE CORRECT
7. No Print out		Contact FISHWATCH 1800 065 522

APPENDIX 7 REVIEW SERVICE BRIEF

SPECIFICATIONS AND KEY DELIVERABLES

PIRSA Fisheries is seeking to appoint an independent reviewer(s) to assess the operation and effectiveness of the integrated video monitoring and electronic catch recording system in the Southern Zone Rock Lobster Fishery.

1. The independent reviewer(s) will be required to produce a written report for the Executive Director, Fisheries, detailing the findings from the review process by close of business on 9th February 2007.

2. The system should be evaluated using the following criteria:
   a) Deterrence value.
   b) Compliance and monitoring benefits
   c) Capacity to contribute to intelligence gathering.
   d) Operational issues including start up and ongoing system maintenance
   e) Degree to which technical specifications have been met
   f) Data quality – that is in terms of use in legal proceedings

3. An assessment of the system will be made to provide information about the following:

   a) Compliance approach to utilising the technology
   b) improvements to weighing process to achieve best deterrence value around the equipment
   c) Improvement in camera positions and
   d) Comments on possible future improvements and/or modifications to the system.

4. The independent reviewer(s) will be required to consult with commercial industry representatives and PIRSA Fisheries staff during the review process. PIRSA Fisheries can provide relevant contact details to assist reviewers with this consultation. The independent reviewer(s) will be required to provide a list of all people that were consulted during the review process, but information in the report should be attributed to individuals or organisations.

5. The independent reviewer(s) will be required to undertake a visit to the South East of South Australia. The reviewer will visit all (7) weighing stations in the Southern Zone Rock Lobster Fishery, to gather information and identify any issues that may need to be addressed at individual ports. This information should be outlined in the report.

APPENDIX 8 NETWORK REVIEW PROPOSAL

ASCOT ENGINEERING
IT & T PROJECT MANAGEMENT AND COMMUNICATIONS ENGINEERING SERVICES
16 GRAYDALE STREET, WEST BEACH, S.A. 5024
P.O. BOX 702, GLENELG, S.A. 5045
TELEPHONE (61) (08) 82359606
FACSIMILE (61) (08) 82359538

27/2/08

PIRSA ICT Infrastructure Services

Attn: B Leckie

L13, 25 Grenfell St

Adelaide, 5000, S.A.

RE: SZRL electronic weighting & monitoring system

Ascot Engineering has been asked to assist PIRSA ICT with a review of the SZRL electronic weighting & monitoring system and specifically the underlying communications infrastructure. Based on the information provided the key issues to be addresses are:

- WAN stability, capacity and performance
- Real time video monitoring (individual and multiple cameras)
- Video image download

Given the complex nature of the project, the technologies involved and the fact it is spread of multiple remote locations will necessitate a combination of data / design information collection, site inspections, in situ network monitoring and transfer testing. The proposed review methodology is:

- Collate available specification / scope / O&M documentation;
- Identify the installed WAN connectivity (carrier identification, access plans, etc);
- Identify the installed video capture, viewing, recording & playback system and calculate the communications requirements;
- Visit the core sites and representative DSL and NextG sites. Confirm configuration details, test LAN operation and observe the remote monitoring and realised performance;
- Establish a network monitoring station running Nagios and MRTG or suitable equivalent software to monitor network availability and WAN throughput;
- Visit remote sites, confirm network configuration, operation and WAN throughput;
- Collect and analysis monitoring information;
- Report on finding and make recommendations.

The review is expected to take in the vicinity of 120 hours and will require a minimum of 1 week in the South East. The works may be completed on an hourly basis (default), day rate or fixed fee (30% uprate).

We understand the urgency of the report and with the number of short weeks in March propose a preliminary review completed over three weeks. The first week to prepare, the second week on site (4 days, 11/3/08 – 14/3/08) and the final week to collate and prepare the preliminary report.

To minimise travel time and maximise available time in the South East the plan is to fly in on the first morning flight, use a local hire car, work Tuesday to Friday and return Friday late pm. Transport, accommodation and subsistence will be passed through at cost.

I trust this proposal meets with your requirements. If there are any questions please feel free to give me a call.

Regards

Robert Hettner

APPENDIX 9 REVIEW EVALUATION REPORT

WARNER & ASSOCIATES PTY LTD
ABN 25 053 735 283

Our Ref: A19829/2
Your Ref: F98/0527

9th February 2007

Ms Kelly Crosthwaite
Senior Fisheries Manager
PIRSA Fisheries
PO Box 1625
ADELAIDE SA 5001

Dear Kelly

Independent assessment of electronic scales and video monitoring system implemented in the Southern Zone Rock Lobster Fishery, Limestone Coast, South Australia.

Thank you for the opportunity of providing this service to you, which has now been completed.

Should you have any questions at all concerning any aspect of our report attached, please do not hesitate to contact me.

Yours sincerely

PETER WARNER

PO Box 7189 Hutt Street ADELAIDE 5000
Email; info@warnerassociates.com.au
Telephone (08) 8113 3333
Facsimile (08) 8113 3344

I N D E X

Page

1. INSTRUCTIONS / RESPONSE TO INSTRUCTIONS

Thank you for your instructions received 22nd November 2006. Resulting from these instructions, Peter Warner reports.

Instructions

Instructions in this matter were received from your Ms Kelly Crosthwaite and were as follows:

- *Assess the operation and effectiveness of the integrated video monitoring and electronic catch recording system in the Southern Zone Rock Lobster Fishery during the first season of operation.*

- *Following the assessment, produce a written report detailing the findings from the review process by close of business 9th February 2007.*

Response to Instructions

In response to your instructions, the assessment was conducted in the Southern Zone Rock Lobster Fishery during three visits to the area:

- 05/12/2006 – 10/12/2006
- 12/12/2006 – 16/12/2006
- 23/01/2007 – 26/01/2007.

Consultations took place with the representative of the Professional Fishermen's Association, 58 fishermen at weighing stations, five local Compliance Officers (including two per telephone as not at location) and installers and suppliers of the equipment.

During the assessment, equipment inspection took place at each of the seven ports: Port MacDonnell, Blackfellow Caves, Carpenter Rocks, Southend, Beachport, Robe and Cape Jaffa. Photographs were obtained at each location (see Section 5).

Following this, consultation took place with Fisheries Managers at Adelaide and Birkenhead, as well as the FMC Industry Extension Officer.

2. EVALUATION OF VIDEO MONITORING & ELECTRONIC CATCH SYSTEM

Video Monitoring Equipment

Inspection of ports at Port MacDonnell, Blackfellow Caves, Carpenter Rocks, Southend, Beachport and Cape Jaffa, revealed all had camera and recording devices fitted as previously installed at Robe.

The majority were fitted with two pole cameras, one positioned with a view of the area outside the scales and the other overlooking the approach to the scales. All ports were fitted with a dome camera inside the enclosure overlooking the immediate area of the scales operation.

The exceptions to the pole cameras were Beachport, where the cameras were mounted on a building, and at Cape Jaffa on a gantry. Both were positioned to enable a view as described for other ports.

Secure lockable attachments to the scales enclosures housed the recording devices in stainless steel cabinets.

Video information on these recording units at the site are recorded 24/7 and information is available direct from these units via a laptop.

There have been unexpected communications difficulties in enabling the data transfer from sites. This is as a result of attempting to install data from electronic scales onto the vision. All indications, including my own previous enquiries, revealed no anticipated difficulties in transferring additional data onto the video image. This was supported by suppliers.

Control Corp's approach was to first of all establish the "hook-up" of data onto vision at Robe, as this location had already been converted to video and was on broadband. Unfortunately, it was found both the video and scales information would not "talk to each other" and the equipment installed was not able to produce the results required.

As a result of several meetings and trials with Telstra, Control Corp now has a newly developed router for trial which will enable both video and scales data to be recorded together. Control Corp submitted a quote for this new trial, which I understand has recently been accepted.

When evaluating equipment such as this, it is important to keep in mind we are dealing with new technology.

At the time of assessing the video systems at all ports, the trial (video/scales data on vision) at Robe had not been successful. As a result, video images off-site at all locations other than Robe are totally unsatisfactory.

As far as communications are concerned, there are now four ports on "hardwire" broadband – Robe, Port MacDonnell, Beachport and Southend (the

latter on line during December 2006). Blackfellow Caves, Carpenter Rocks[74] and Cape Jaffa are on dial-up.

It is understood "wireless" broadband Telstra Next G Network will be available shortly at the ports where "hardwire" is not available.

As a result of difficulties with communications at Robe, understandably Port MacDonnell, Beachport and Southend have not been connected to broadband even though access is available. It seems logical to overcome difficulties at Robe first and then bring the others on line.

To enable images to be available offsite, Thompson Security installed a "dial-up" modem for each of the sites at Blackfellow Caves, Carpenters Rocks, Southend and Cape Jaffa. These images offsite are not user-friendly at all and are completely unsatisfactory. To view live or retrieve images is extremely slow and the vision is extremely poor. As a result, these dial-up facilities are not being used. It should be pointed out, however, acceptable images are possible direct from the site recorders using a laptop.

Once again it is important we keep in mind that the video monitoring system is designed for broadband technology.

Being unable to accurately test video images at ports other than Robe, our view is the same as reported during our earlier assessment at Robe in regard to the following:

- Deterrent value
- Capacity to contribute to intelligence gathering
- Use of video as admissible evidence
- Quality of video taken
- Whether persons can be identified
- Who makes the decision if further action is required in relation to video.

We consider it unhelpful to repeat comments of each of these criteria.

The following has not been assessed directly as a result of unavailability of images at ports other than Robe:

- Resource requirements to catch benefits
- Overall cost benefit analysis of compliance users
- Length of time images are kept
- How images are monitored
- Who is responsible for the use of evidence
- What procedures are in place to ensure chain of evidence.

Electronic Catch System

Information obtained revealed equipment utilised for the electronic catch system is based on equipment used in the 2002 trial at Beachport. There has been a number of changes to the software as the result of additional requirements. The touch screen has been increased from 6 inches to 12 inches and all buttons on the screen have doubled in size. The electrics for the operation have been housed in the secured, attached enclosure.

The approach has been to record data on hard drive as an interim measure with a long term view to go to “Compact Flash”. The interim measure is to enable implementation of a number of requests for changes which are ongoing. If it is on Compact Flash, those changes are more difficult than effecting the changes on hard drive. Generally, the procedure when developing a system is to build it on hard drive, create the image required, then put it onto Compact Flash. (Compact Flash is a bubble memory or it is electronic memory with no moving parts.)

At the present time, Windows XP Pro is running. When at a stage where the image is accepted, XP Embedded will be used. (This is a version of the operating system where everything not required can be “stripped out” with the ability to retain what is needed.)

Originally the system was designed to record Part A and Part B of the current CDR at the scales on the touch screen. (This system was trialled at Beachport during the 2002 trial.)

A decision was made not to incorporate Part A at the scales as other methods were being investigated. This includes recording Part A information at sea via other measures, such as IVR (Integrated Voice Recording).

In practice, the electronic scales have been extremely well received by the fishermen and other stakeholders (see comments in Section 3). In short, they have been a huge success.

A feature of the system is its ease of use. The fishermen use their pin coded eye buttons to activate the unit and then place each bin on the scales, which records the weight electronically on a touch screen. (The weight will only be displayed once the scales are steady.) After weighing all bins, a hard copy print-out is received detailing totals.

During the evaluation process, the recording of electronic scales data has not been available on vision and therefore we are unable to provide an assessment. At the present time, CDR hard copies are being forwarded by Control Corp once per month. The vision of this data is not available for the same reasons as outlined when describing communications difficulties with video images.

3. CONSULTATION WITH STAKEHOLDERS

Consultations

During the review process, the following persons were consulted:

Fishermen

Port MacDonnell

Chris Kain	Dick Williams
Nick Cawthorn	Trevor Wilson
Richard Clark	Scott Chant
Gordon Lewis	Bryce Cutting
Ian Taylor	Phil Lewis
Nigel Feast	Shane Tulley

Blackfellow Caves

John Ashby	Roger Cutting
Mark Ashby	Bill Ashby
Wayne Taylor	Kim Talbot

Carpenter Rocks

Matt von Stanke	Wayne Walker
Jamie Allen	Wade von Stanke
Cody von Stanke	Rowan Grainie
Brian McQuade	Len McQuade
Chris von Stanke	Greg von Stanke

Southend

Peter Fabris	Andrew Rapp
Steven Galli	Trevor Wallace
Darryl Brooks	John Wakelin

Beachport

Craig Riley	Peter Walters
Dean Thorn	Paul Marshall
Daniel Hibbard	David Dunstan
Gary Dunstan	Kevin Backler

Robe

Mark Denton	Ashley Sampson
Dean Woodward	Craig Saltmarsh
Geoff Hunt	Paul Regnier

Cape Jaffa

Peter Page	Gary Braithwaite
Mike Lewis	Steven Zadow
Bruce Zadow	Neil Lisk
Peter Clark	Peter Woodward
Derek Woodward	Wayne Gale

Compliance

Adelaide

Paul Taterelli

Mount Gambier

Mel Snart	Sean Dowdell (via telephone)

Kingston

Margie Rowley	Ben Gromola
Hamish Telfor (via telephone)	

South-East Professional Fishermen's Association

Lionel Carrison

FMC Industry Extension Officer

Roger Edwards

Management

Kelly Crosthwaite	Mark Lewis

Video Supplier / Installer

Kevin Thompson (Thompson Security)	Matt Fisher (Bounty Solutions)

Electronic Scales Supplier / Installer

Jason Beveridge

Stakeholder Comments

Fishermen

Without exception, all fishermen consulted were happy with the electronic scales. Apart from a few teething problems, everything has worked well since installation. A general comment was, “it makes life easier” when weighing. There were some comments and suggestions.

- A request for the remainder of quota to be on the print-out – similar to ATM slips.
- Is it possible to have a transaction beep after each step, also similar to ATM machines?
- There should be a spare print-out roll at the scales.
- Fishermen must change a roll if indicators show it is about to run out. Don’t leave it to the next fisherman.
- Who is responsible for the availability of print-out rolls?
- Who is responsible for cleaning the scales?
- Fishermen should keep using CDR forms for back-up.
- It is expected there will be a reduction in licence fees.

Interestingly, even though fishermen were asked about the video as well as the scales, they only wanted to talk about the scales. It certainly appears they have accepted the video equipment. There was one query at Beachport, where apparently a couple of items were stolen and a fisherman was unhappy that the video did not work at that time.

Other general comments from some fishermen were as follows:

- Not happy about proposed Fishing Council, getting rid of FMC’s. Only done to stop fishermen having too much say.
- Once system is running, we won’t have to prior report.
- It is expected 200 hours will be reduced from compliance costs.

- The request for a ring-in (text) or other similar device for recording undersized, dead fish etc from the boat without the need for paperwork.

- Water allowance for bins generally accepted but not by some processors.

- Ensure back-up for all electronic scales.

- Request for an additional camera overlooking the Port MacDonnell jetty.

- Request for an additional camera overlooking the bay area at Carpenter Rocks.

- More control over recreational fishermen.

Compliance

Compliance Officers are of the view that the effectiveness of video monitoring at all ports other than Robe at the present time can only be described as totally unsatisfactory.

- Dial-up is a waste of time.

- Too long to obtain an image.

- Distorted vision.

- Extremely slow to review prior images.

- Not useful for Compliance operations in its present form.

At Robe, the video monitoring system has been a valuable tool in checking general landings and gaining intelligence regarding times of landings and behaviour of licence holders. Other comments were:

- The system may shift illegal behaviours to another part of the fishing process.

- Difficulty in identifying fishermen.

All have been positive about the electronic scales, particularly in relation to accurate weights and fishermen's unique pin numbers for identification.

Concerns were as follows:

- Not knowing what is in the bins when they are weighed.
- Not knowing what is in other bins supposedly containing bait, octopus etc.

Other general comments were:

- Staffing requirements for video monitoring.
- The introduction of sealed bins and tags.
- Bins to be opened at scales if not sealed and tagged.
- IVR reports for Part A of the CDR from boat before landing.

Meetings with other Persons

- The representative of the Professional Fishermen's Association
- The FMC Extensions Officer
- Suppliers and installers
- Fisheries management.

4. COMPLIANCE APPROACH – SUGGESTED IMPROVEMENTS

The electronic scales data is not available on the system owing to difficulties with communications. As a result, we are not able to provide an assessment of best use of the technology.

Video images at all locations except Robe are unsatisfactory owing to dial-up technology. Once again, we are unable to provide an assessment at this time.

Having attended and witnessed multiple weighings at all ports, it became obvious there is an area that must be improved. All bins are weighed with lids on with no way of knowing what is inside. The video image is of no help. A bin could contain bait, octopus or anything else. Alternatively, there are other bins that are not weighed, presumably containing bait, octopus etc, but could contain lobster.

It is our view that either these bins are sealed and tagged at the boat before coming ashore or lids will have to come off at the scales. The preference would be the former as, during an earlier assessment, most fishermen had no difficulty when asked about using sealed bins.

Further suggested improvements include:

- A wireless camera overlooking the Port MacDonnell jetty. There is no control at all, particularly as the weighing station has been removed (see attached photograph 4).

- A wireless camera on the western side of the boat ramp overlooking the eastern side of the bay at Carpenter Rocks. This area is out of view of the weigh station (see attached photographs 9 and 10).

It is our view that when the integrated data is available and reliable, Compliance Officers will seek to widen the use of video cameras at the ports, in particular, to include vision of jetties, boat moorings etc. With the new system installed and operating, additional cameras are a minimal expense. There have already been instances where Compliance Officers have asked the supplier if cameras can be re-directed.

The approach should be to utilise the new system to gather information on activities at the ports including behaviour patterns of fishermen and processors to enhance investigation activities in other areas. There will be a need to refocus resources to achieve the best possible outcome.

5. EVALUATION LOCATIONS – LIMESTONE COAST

All ports were visited and photographs obtained of camera and electronic scales installations.

Video Cameras

All weighing stations except Robe and Port MacDonnell were fitted with three cameras, one covering the approach, one with a view of the area immediately outside the scales enclosure, and a dome unit inside the enclosure overlooking the scales.

The two outside cameras were mostly affixed to a pole above the stations. Beachport units were attached to a close building wall and Cape Jaffa's were fixed to a gantry. Port MacDonnell was set up similarly but had an additional pole camera overlooking the second scales enclosure. Robe had the same number of cameras as detailed in the earlier assessment.

Electronic Scales

Electronic scales were viewed whilst in use at all ports and appeared to work efficiently.

Recorders

Recorders were installed in an attachment to the scales enclosure and were housed in a stainless steel cabinet.

Photographs

Photographs were obtained of equipment at all weighing stations and are attached to this report.

- Port MacDonnell – Photos 1, 2 and 3
- Blackfellow Caves – Photos 5 and 6
- Carpenter Rocks – Photos 7 and 8
- Southend – Photos 11 and 12
- Beachport – Photos 13, 14, 15 and 16
- Robe – Photos 17 and 18
- Cape Jaffa – Photos 19, 20, 21 and 22.

6. SUMMARY / RECOMMENDATIONS

Summary

Having assessed the video monitoring and electronic catch systems of all ports in the Southern Zone Rock Lobster Fishery, we are limited in comments we are able to make.

The system is not at a stage where the full potential can be assessed to the extent we believe will be the eventual outcome.

Obviously the end result will be to have a fully integrated system which will record video and electronic scale data to PIRSA 24/7.

As a result of communications difficulties, it has not been possible to integrate both systems for reasons as outlined previously. Earlier information revealed this would not be a problem. To overcome this, Telstra have developed a router which will integrate both systems. This equipment is on loan to Control Corp.

Control Corp, we understand, has recently been given approval to develop this new equipment, which will enable an immediate trial. It is anticipated the trial will be ready for testing within one month.

Video cameras and equipment have now been installed at all other weighing stations in the Southern Zone, which should have the potential to operate as successfully as in Robe.

Once again, the communications problem has delayed broadband “hook-up” to Port MacDonnell, Beachport and Southend. Blackfellow Caves, Carpenter Rocks and Cape Jaffa will shortly have access to “wireless” broadband.

As a temporary measure, dial-up was installed at Blackfellow Caves, Carpenters Rocks, Southend and Cape Jaffa, which has been unsatisfactory for compliance purposes.

Cameras, recorders and electronic scales at the weigh stations at each port have been installed professionally and are able to record all information at the site.

The electronic scales have been an outstanding success, widely accepted by all stakeholders. Once again, full potential has not been realised owing to communications difficulties.

Recommendations

We recommend internal checks are conducted with Control Corp to test communications equipment during the next month whilst in the current fishing season.

If difficulties are overcome and video and electronic data is integrated following a trial during this current season, we recommend compiling CDR's in parallel for two months into the next fishing season to establish consistency and confidence in the new system.

Should the trial be delayed, the decision should be to continue a parallel system for the entire '07/'08 season.

It is also strongly suggested that priority consideration be given to the following:

- Introducing sealed bins with coded tags.
- The introduction of integrated voice recordings (IVR's) on vessels to replace current Part A of the CDR.
- Installation of wireless cameras at the Port MacDonnell jetty and the unprotected bay area at Carpenter Rocks.
- Ensuring an effective maintenance program for all equipment.

Other issues for consideration:

- Fishermen should be advised to treat their eye button I/D the same as they treat their credit card pin number. (It may be the subject of an investigation that can directly affect them.)
- Investigate the possibility of a 'beep' after each weigh and other transactions, similar to an ATM.
- Print-out at scales to include remaining quota.

In anticipation of both video and electronic scales data being integrated, it will be necessary to refocus resources, particularly Compliance, to enable full advantage of the new technology.

It is accepted that weigh stations are only one area of concern with regard to compliance issues, however, it will be possible to plan and implement strategies at other locations based on the collated data and vision available from the new system.

APPENDIX 10 NETWORK REVIEW REPORT

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Preliminary Southern Zone Rock Lobster Electronic Scale and Remote Video Monitoring Network Review

Date: 25/3/2008
Author: Robert Hettner
Version: 1.0, for review

EXECUTIVE SUMMARY

The **Preliminary Southern Zone Rock Lobster Electronic Scale and Remote Video Monitoring Network Review** focused on the communications infrastructure linking the sites to ascertain if there were underlying issues impacting the performance of the remote video monitoring. The design review and testing highlighted a number of issues:

- The installed system does not match the previously accepted remote video monitoring test;
- The VPN IPSec encryption may be more secure than required to protect the video monitoring traffic data stream. The processing overhead is increasing link latency resulting in a decrease in network throughput. The encryption may be required to protect the eScale data;
- The double hop between the monitored ports, the central site (Control Corp) and the monitoring station at PIRSA Mt Gambier is increasing link latency which decrease network throughput;
- VPN IPSec encryption, MTU settings and path MTU determination may be increasing IP fragmentation resulting in a decrease in network throughput;
- Errors on the links may be significantly decreasing the network throughput, specifically at Port Mac Donnell and Beachport;
- Other internet and intranet traffic may be impacting network reliability and capacity resulting in a decrease in network throughput;
- The video monitoring station at PIRSA Mt Gambier is a standard PIRSA build complete with the Novell client. While this is not a significant issue it does make it difficult to customise for the required purpose (eg network control panel is locked). There may also be significant scope to modify the TCP stack to improve TCP throughput but this would need to be tested.

PRELIMINARY RECOMMENDATIONS

Due to the complex nature of the network and the broad range of available options the recommendations have been presented with reference to complexity, relative cost and gain and are grouped as Preliminary, Intermediate and Long Term Recommendations. The purpose of the preliminary recommendations is to identify the straightforward options available to the project team to prove the remote monitoring component of the project.

1. Develop a quantitative video quality test (eg test pattern resolution, selected camera monitor image quality at a consistent / common window size)
2. Upgrade VPN routers and dsl modems to latest firmware, set VPN units MTU in accordance with Internode recommendations and test internet and intranet download / upload speeds;
3. PIRSA Mt Gambier monitoring station – Enable network control panel, Disable the Novell client and modify XP TCP receive window and MSS/MTU settings to suite video monitoring (eg SG TCP Optimizer);
4. Confirm XP client name resolution process, node types and eliminate broadcast name lookups (possibly implement LMHOSTS files on eScale PCs);
5. Establish a service on the remote VPN units redirecting incoming (video monitoring) requests to Adpro FastTrace then redirect video request (or add new sites) from the PIRSA Mt Gambier monitoring station via the internet (hard code WAN / dyndns address into video monitoring software) and confirm throughput and video quality.

If these recommendations confirm acceptable video quality at a reference site, eg Robe, it reconfirms the remote video monitoring concept via the provided infrastructure.

Refer to the Recommendation section for the Intermediate and Long Term Recommendations and Future considerations.

INDEX

INTRODUCTION

Due to ongoing performance issues with Southern Zone Rock Lobster (SZRL) Electronic Scale (eScale) and remote video monitoring network, Ascot Engineering was engaged to review the network, more specifically the performance of the remote video monitoring and make recommendation to improve its performance. The video quality is not acceptable for PIRSA compliance staff due to poor image quality / slow scan rates and slow video file recovery from the remote monitoring (Adpro FastTrace) units.

INITIAL REMOTE VIDEO MONITORING TESTING

During the early stages of the remote video monitoring project a test (monitored) dsl based site was established at Robe with multiple cameras and a dsl monitoring site was established at PIR Mt Gambier (TBC). A direct (un-encrypted link) was established between Robe & Mt Gambier and the video quality was deemed satisfactory.

No commissioning information, detailed throughput, LAN/WAN data profile or traffic analysis information for the test installation was available.

The installation of the network proceeded with a significantly different network design / topology, a hub / spoke VPN with high level encryption was introduced with no additional testing.

NETWORK OVERVIEW

The seven ports being monitored (Port MacDonnell, Blackfellows Caves, Carpenters Rocks, Southend, Beachport, Robe & Cape Jaffa) are connected back the central site at Control Corp, Mt Gambier via a IPsec secured VPN network. At each monitored port there is an Adpro FastTrace video unit and one to two eSacle PCs, a VPN router and modem.

The type of modem at each site is dependant on the WAN technology available, either dsl, the preferred connectivity or Next-G, if dsl is not available. The monitored dsl sites that have been established with 512/512 kbps symmetrical links are:

- Port MacDonnell
- Southend
- Beachport
- Robe

The monitored Next-G sites that have been established are:

- Blackfellows Caves
- Carpenters Rocks
- Cape Jaffa

The three monitoring sites (Thomson Security, Mt Gambier, PIRSA Mt Gambier and PIRSA Kingston) are also connected back the central site at Control Corp, Mt Gambier via a IPsec secured VPN network. At each monitoring site there is a PC (with video monitoring / control software), a VPN router and dsl modem.

The central site (Control Corp, Mt Gambier) houses the central PC (with eScale database / control / FTP software), a VPN router and dsl modem with a nominally 512/512 kbps link.

No commissioning information, detailed throughput, LAN/WAN data profile or traffic analysis information for the existing installation(s) was available prior to the onsite investigation.

LIMITATIONS

Due to a number of considerations it is not possible to provide a comprehensive review and associated recommendations in the time frames available. Considerations include:

- Time frame limitations (SZRL season, on-site review & reporting)

- Geographical separation
- Limited technical information (re dsl service / capacity, Next-G service / capacity)
- Diverse technical design (multiple WAN technologies)
- Equipment and supplier / manufacture support limitations (model selection, SNMP functionality)
- Network stability / availability (monitored Next-G offline)

To maximise the value of the review, report and recommendations it was necessary to limit the review and focus on the key issue, the performance of the remote video monitoring over the (preferred) dsl WAN links. The review and analysis of the Next-G technology and sites will have to be addressed at a later date.

METHODOLOGY

The initial requirement was to establish the baseline traffic profile for the network and more specifically the video monitoring traffic from the sites to ascertain the traffic requirements for a suitable level of video monitoring performance. Based on the manufactures information that the central VPN firewall box supported SNMP v2 it was decided to establish an MRTG based monitoring station to track and graph the traffic profile of the video monitoring data (stream). In addition to the traffic analysis the system was extended to monitor Round Trip Times (RTT) and packet loss. These are measures of link performance and effect the data through put capacity of the links.

Due to significant limitations with the VPN firewall box SNMP support this was not viable and an alternative approach was established, at very short notice, to monitor the traffic at PIRSA, Mt Gambier via introduction of a SNMP capable switch. This enabled the traffic into / out off PIRSA, Mt Gambier site to be monitored but not across the whole network.

In addition to the traffic analysis, RTT and packet loss the following tools were used:

- FTP servers were established at PIRSA, Mt Gambier and Control Corp, Mt Gambier to measure available bandwidth between the sites. This was tested both across the intranet (via the VPN network) and the internet;
- Online speed test sites were used to measure the available (dsl) bandwidth at sites;
- Ping tests were run via the internet and intranet to verify / refine RTT times and packet loss;
- Trace route tests were tried but failed within the intranet (equipment selection limitation ?);
- TCP dump file were taken for later analysis of the data transfer.

To confirm dsl performance alternative dsl modems were used. Netgear dsl modems with the latest firmware and Billion dsl modems were both tested in place of the existing Netgear dsl modems to confirm if there were underlying dsl performance issues.

FINDINGS

The initial traffic analysis indicated very poor data transfer between Pt MacDonnell and PIRSA Mt Gambier:

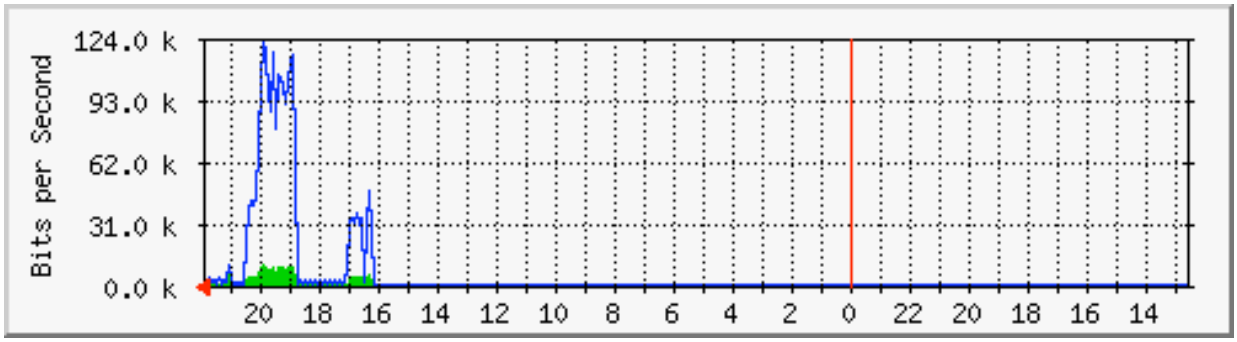

Fig 1: PIRSA Workstation Traffic – 21:50 12/3/08

- The first transfer (16:00 – 17:00 read earliest times from the right) is Pt MacDonnell video monitoring @ 28 kbps (approximately)
- The second transfer (18:500 – 20:40) is Pt MacDonnell video monitoring @ 95 kbps (approximately). Note traffic drop off towards dusk.

In addition to the (differing) video monitoring speeds the ftp transfer testing indicated a link capacity of approximately 182 kbps from Pt MacDonnell to PIRSA Mt Gambier. The poor performance and lack of commissioning data necessitated verification of the dsl services.

DSL SERVICES

There was a concern that the underlying dsl service or dsl modems / firmware may be an issue. Via a range of tests (Internet download / upload, internet / intranet ftp transfer) utilising different equipment the flowing dsl services were verified

- Control Corp, Mt Gambier, nominally 512 / 512 kbps sdsl, actually 410 / 315 kbps sdsl
- PIRSA, Mt Gambier, nominally 1.5 mbps / 512 kbps adsl, actually 1.2 mbps / 207 kbps adsl
- Pt MacDonnell, nominally 512 / 512 kbps sdsl, actually 399 / 365 kbps sdsl

While not operating at the nominal rates these services appear to be operating correctly. Due to time limitations it was not possible to test the dsl services at other sites.

NEXT-G SERVICE

Due to time limitations it was not possible to test the Next-G modems stability or capacity in situ but it was noted that there was no signal at ground level at Carpenters Rocks.

** The next-G sites have been of line for a number of weeks due to a suspected incompatibility between the VPN router software and latest model Next-G modem software (TBC) **

Attempts were made to ascertain the capacity of the Next-G modems but due to time limitations no tests were initiated.

FTP TRANSFER TESTING

A significant number of FTP transfers were initiated to test the VPN network performance and is used to ascertain the capacity of the network to transfer data. The key transfer rates, which relates to the ability to monitor video data at PIRSA Mt Gambier are:

- The capacity of transfer data from Pt MacDonnell to Control Corp was 175 kbps
- The capacity of transfer data from Control Corp to PIRSA Mt Gambier was 406 kbps
- The capacity of transfer data from Pt MacDonnell to PIRSA Mt Gambier was 182 kbps

This appears to be limited by the capacity of the Pt MacDonnell / Control Corp link and is inline with the results of the video monitoring data stream (95 kbps approximately).

In addition a number of FTP transfers were initiated to test the internet network performance and is used to ascertain the capacity of the network to transfer data directly between the sites. The key transfer rate is:

- The capacity of transfer data directly from Pt MacDonnell to PIRSA Mt Gambier, unencrypted was 365 kbps

The critical aspect of these results is the significant difference between the VPN and (raw) internet network performance. This indicates that increased latency decreases network through put in accordance with TCP transfer modelling.

ROUND TRIP TIME

An MRTG based Round Trip Time monitor was established and ping tests were used to ascertain the network latency across the VPN and (raw) internet. Latency has an impact on the capacity of a network to transfer TCP data.

Fig 2: Port MacDonnell RTT graph

The Port MacDonnell RTT graph is typical of the RTT graphs for each of the monitored sites, the critical aspect being the significant variation in RTT responses. These responses were independent of SZRL Electronic Scale (eScale) and remote video monitoring network traffic, indicating that other (internet traffic) was probably influencing RTT values.

The key RTTs (as measured by multiple ping tests) are:

- PIRSA Mt Gambier / Control Corp via the VPN network was 42 ms
- PIRSA Mt Gambier / Pt MacDonnell via the VPN network was 84 ms
- PIRSA Mt Gambier / Pt MacDonnell via the internet network was 42 ms

The critical aspect of these results is the significant difference between the VPN and (raw) internet network performance. The increased latency of the VPN network has the theoretical impact of decreasing the capacity of a link (@ 365 kbps) by 8.5 %.

PACKET LOSS

An MRTG based packet loss monitor was established and ping tests were used to ascertain the network error rates across the VPN and (raw) internet. Packet loss has an impact on the capacity of a network to transfer data by forcing the retransmission of damaged TCP packets.

The VPN packet loss statistics which were collected over one night (5000 pings) were:

- PIRSA Mt Gambier / Control Corp via the VPN network was 0 % packet loss
- PIRSA Mt Gambier / Pt MacDonnell via the VPN network was 0% packet loss
- PIRSA Mt Gambier / Robe via the VPN network was 0% packet loss
- PIRSA Mt Gambier / Southend via the VPN network was 0% packet loss
- PIRSA Mt Gambier / Beachport via the VPN network was 0% packet loss

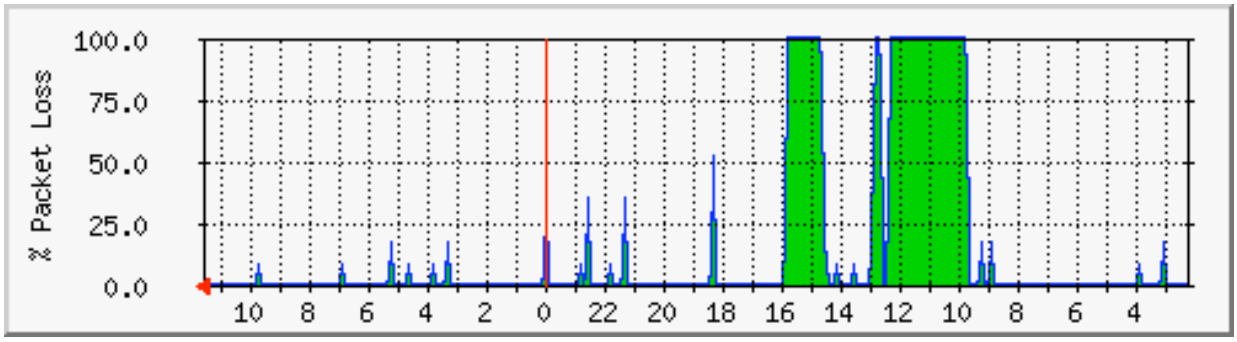

Fig 3: Port MacDonnell packet loss graph

- Ignore major (green) outage, this packet loss was due to other testing work

These multiple ping results are at odds with the packet loss monitor and indicate that packet loss is probably related to other (internet traffic) as per the RTT value variations.

The (limited) internet packet loss statistics which were collected during business hours (200 pings) were:

- PIRSA Mt Gambier / Control Corp via the VPN network was 55 % packet loss
- PIRSA Mt Gambier / Pt MacDonnell via the VPN network was 3% packet loss
- PIRSA Mt Gambier / Robe via the VPN network was 1% packet loss
- PIRSA Mt Gambier / Southend via the VPN network was 1% packet loss
- PIRSA Mt Gambier / Beachport via the VPN network was 40% packet loss

The critical aspect of these results is the correlation between the Pt MacDonnell and Beachport packet loss and poor video performance and the relative stability of the Robe and Southend sites and better video performance. This will need to be investigated to confirm if the error rates on the links are responsible for the varying video monitoring performance.

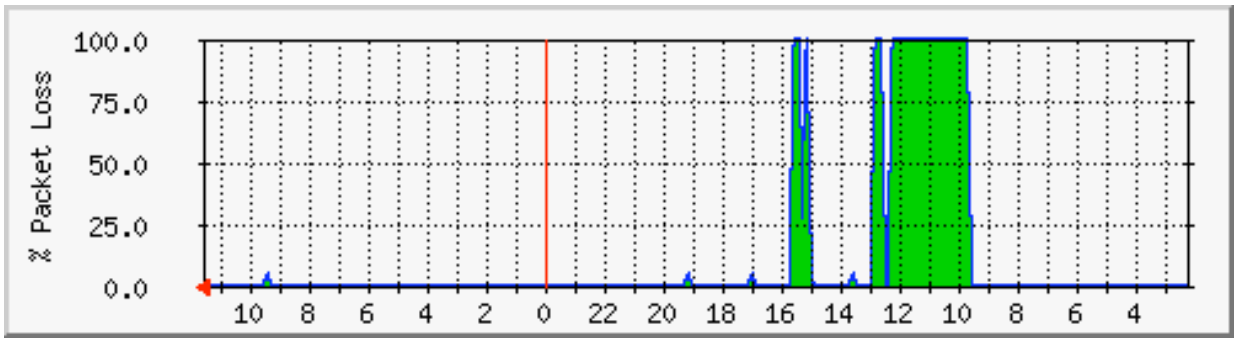

Fig 4: PIRSA Monitor Server – Robe Packet Loss

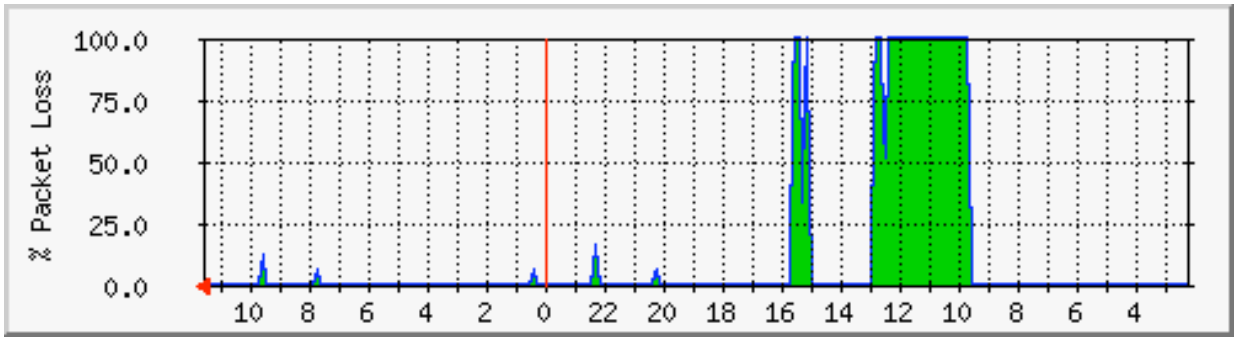

Fig 5: PIRSA Monitor Server – Beachport Packet Loss

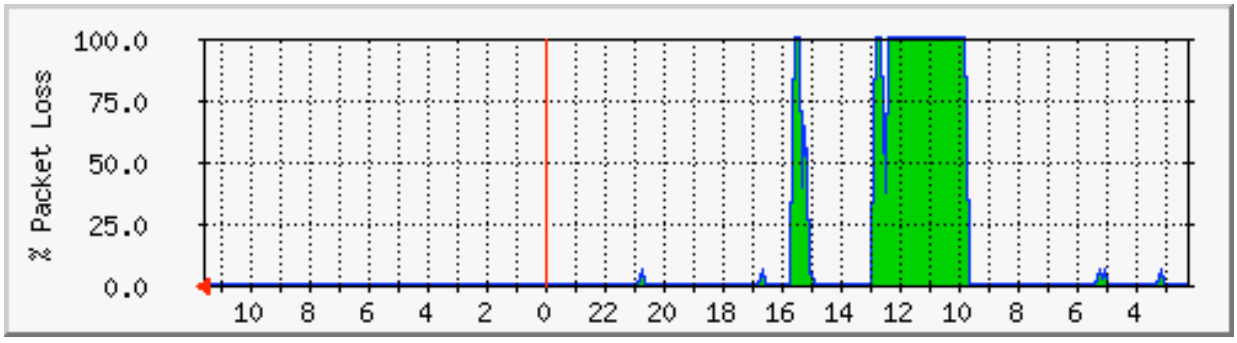

Fig 6: PIRSA Monitor Server – Southend Packet Loss

Due to time limitations it was not possible to monitor the PIRSA work station video monitoring data stream to ascertain the relative TCP retransmissions associated with each site. The tcp dump data associated with the FTP transfers at Pt MacDonnell are still to be analysed.

IP FRAGMENTATION, MTU SETTINGS AND PATH MTU

These is a concern that the combination of the VPN encryption and lower network MTU may result in a significant number of fragmented IP packets. This was briefly investigated and did not appear be a significant factor but should be confirmed with more comprehensive testing.

It was noted that the MTU of the VPN devices was set to 1500 where Internode recommend 1496 due to the introduction of PPoE to establish the connection over the dsl service. A number of tests were initiated to confirm if the MTU settings play a factor in network performance, again this was briefly investigated and did not appear be a significant factor but should be confirmed with more comprehensive testing.

Ping tests were conducted to ascertain the path MTU for the video links via the intranet. The following responses were collected:

- PIRSA Mt Gambier > Control Corp path MTU = 1472 + 28 = 1500 bytes (same DSLAM)
- PIRSA Mt Gambier > Pt MacDonnell path MTU = 1400 + 28 = 1428 bytes
- PIRSA Mt Gambier > Robe path MTU = 1400 + 28 = 1428 bytes

Ping tests were also conducted to ascertain the path MTU via the internet:

- PIRSA Mt Gambier > Pt MacDonnell path MTU = 1432 + 28 = 1450 bytes
- PIRSA Mt Gambier > Robe path MTU = 1432 + 28 = 1450 bytes

The results indicate that MTU settings, path MTU determination and VPN encryption play a factor in decreasing the network throughput. The path MTU via the internet is larger than the path MTU via the intranet.

OTHER TRAFFIC

There are indications that other intranet and internet traffic is impacting network performance, eg significant RTT variations.

It was also noted that Netbios (TBC) was in operation with no WINS or internal DNS capacity (assuming dyndns.biz configuration does not support client initiated dynamic dns updates to the dns zone). There is a concern that Netbios name lookup broadcasts may impact video monitoring traffic but this is not likely to be a significant issue.

VIDEO MONITORING DATA STREAM

Ongoing monitoring identified a significant variation in video monitoring data stream from the different dsl sites:

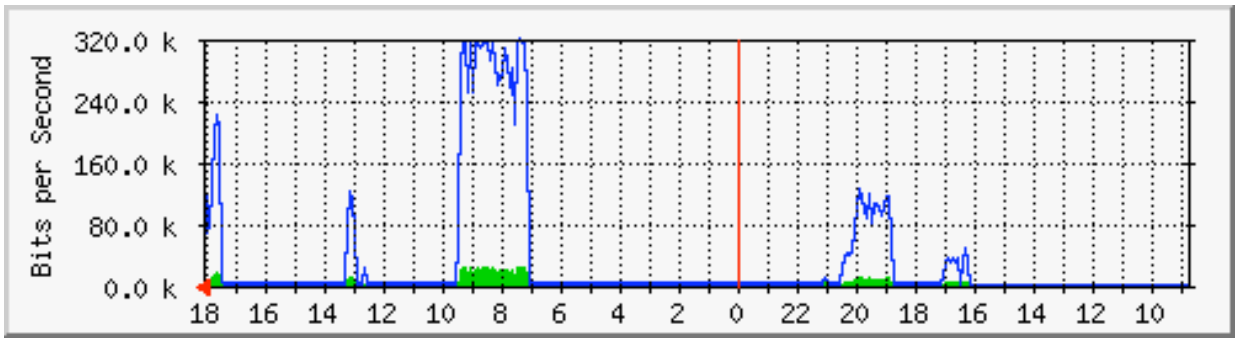

Fig 7: PIRSA Workstation Traffic – 18:00 13/3/08

- The first transfer (16:10 – 17:00) is Pt MacDonnell video monitoring @ 28 kbps (approximately)

- The second transfer (17:50 – 20:40) is Pt MacDonnell video monitoring @ 95 kbps (approximately)
- The third transfer (7:00 – 9:30) is Robe video monitoring @ 280 kbps (approximately)

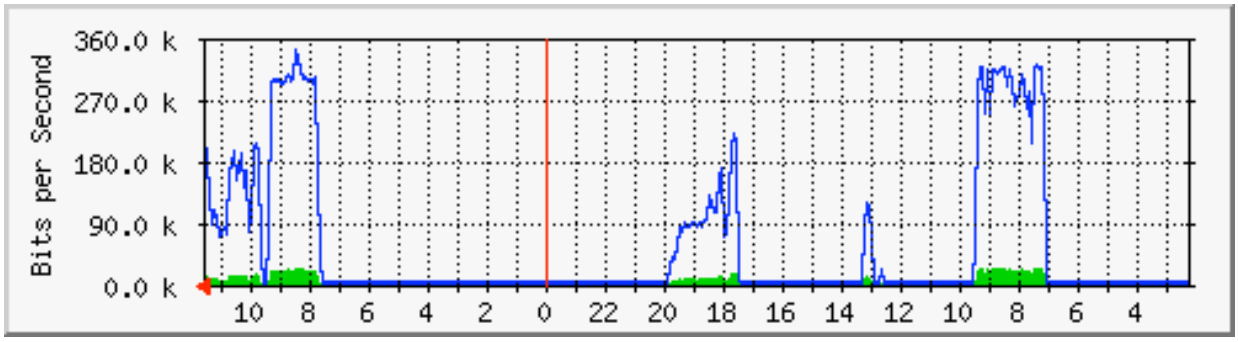

Fig 8: PIRSA Workstation Traffic – 11:30 14/3/08

- The 7:00 – 9:30 transfer is Robe video monitoring @ 280 kbps (approximately)
- The 17:30 – 20:00 transfer is Pt Mac Donnell video monitoring @ 90 kbps (approximately)
- The 7:45 – 9:30 transfer is Southend video monitoring @ 300 kbps (approximately)
- The 9:45 – 11:30 transfer is Beachport video monitoring @ 100 kbps (approximately)

There is a significant performance difference between the Robe & Southend systems and the Port Mac Donnell & Beachport systems.

It was not possible to test the dsl service at Robe or Southend to confirm if they behaved differently to the Port MacDonnell or Beachport dsl services.

ANALYSIS

The analysis of the design, installation and preliminary testing leads to the following conclusions:

- The installed system does not match the previously accepted remote video monitoring test;
- The VPN IPSec encryption may be more secure than required to protect the video monitoring traffic data stream. The processing overhead is increasing link latency resulting in a decrease in network throughput. The encryption may be required to protect the eScale data;
- The double hop between the monitored ports, the central site (Control Corp) and the monitoring station at PIRSA Mt Gambier is (probably) increasing link latency resulting in a decrease in network throughput;
- VPN IPSec encryption, MTU settings and path MTU determination may be increasing IP fragmentation resulting in a decrease in network throughput;
- Errors on the links may be significantly decreasing the network throughput, specifically at Port Mac Donnell and Beachport;
- Other internet and intranet traffic may be impacting network reliability and capacity resulting in a decrease in network throughput;
- The video monitoring station at PIRSA Mt Gambier is a standard PIRSA build c/w the Novell client. While this is not a significant issue it does make it difficult to customise for the required purpose (eg network control panel is locked). There may also be significant scope to modify the TCP stack to improve TCP throughput but this would need to be tested.

RECOMMENDATIONS

Due to the complex nature of the network and the broad range of options the recommendations are presented with reference to complexity, relative cost and gain. They are grouped as Preliminary, Intermediate and Long Term Recommendations.

PRELIMINARY RECOMMENDATIONS

The purpose of the preliminary recommendations is to identify the straightforward options available to the project team to prove the remote monitoring component of the project.

The project team will need to make a determination regarding the security level required for the eSacle data and video monitoring stream and if video monitoring can be transmitted (raw, encoded data stream) via the internet proceed with preliminary recommendation 5:

1. Develop a quantitative video quality test (eg test pattern resolution, selected camera monitor image quality at a consistent / common window size)
2. Upgrade VPN routers and dsl modems to latest firmware, set VPN units MTU in accordance with Internode recommendations and test internet and intranet download / upload speeds;
3. PIRSA Mt Gambier monitoring station – Enable network control panel, Disable the Novell client and modify XP TCP receive window and MSS/MTU settings to suite video monitoring (eg SG TCP Optimizer);
4. Confirm XP client name resolution process, node types and eliminate broadcast name lookups (possibly implement LMHOSTS files on eScale PCs);
5. Establish a service on the remote VPN units redirecting incoming (video monitoring) requests to Adpro FastTrace then redirect video request (or add new sites) from the PIRSA Mt Gambier monitoring station via the internet (hard code WAN / dyndns address into video monitoring software) and confirm throughput and video quality.

*** The practical application of the recommendation will need to be checked. Firewall and video monitoring software may limit configuration / operational parameters ***

If these recommendations confirm acceptable video quality at a reference site, eg Robe, it (re) proves the remote monitoring concept via the provided infrastructure. The remaining sites need to be checked for throughput and video quality and non performing sites identified.

INTERMEDIATE RECOMMENDATIONS

The purpose of the intermediate recommendations is to identify more involved options available to the project team to improve the stability / performance / security of the network.

1. If the direct / internet video monitoring is acceptable establish fixed WAN address for the sites to enable the IP addresses to be fixed in the video monitoring software;
2. Confirm bi-directional MTU and error rates for each link to identify issues with Pt MacDonnell and Beachport links. Modify MTU settings if required and if Pt MacDonnell & Beachport have higher error rates investigate the option of replacing with existing dsl modems with alternative (high quality) units to decrease the error rate;
3. Redirect VPN circuits to the appropriate monitoring site (eg Pt MacDonnell connects directly to PIRSA Mt Gambier etc) and confirm throughput and video quality via the VPN network. If equivalent to the internet links re-establish VPN network / remote monitoring and disable internet remote monitoring;
4. Modify (downgrade) VPN encryption level (if appropriate) to decrease link latency. This should only be necessary if the video monitoring stream has to be encrypted and cant go via the internet;

5. Move the dsl services to a private adsl realm to improve security and decrease the impact of other traffic. This options needs to be considered in conjunction with the dynamic dns system used for name resolution;
6. Establish remote VPN client access to allow remote support of video monitoring equipment.

LONG TERM RECOMMENDATIONS

The purpose of the long term recommendations is to identify more complex / costly options available to the project team to improve the stability / performance / security of the network.

The project team will need to make a determination regarding the long term operating environment (is this an industry group network or a government network) and develop the network accordingly.

1. Assuming acceptable video quality is established support for concurrent multiple site monitoring is required to allow real time monitoring of multiple ports;
2. QoS may need to be establish in concurrent port monitoring and file recovery is required;
3. Replace existing dsl modems and VPN firewalls with single boxes c/w SNMP. If this is migrated to a government network Tier 1 networking equipment should be selected eg Cisco;
4. Establish a monitoring system that can be used to identify performance issues.
5. Establish support / maintenance contract with appropriate response / responsibility structures, documented up time and response time written into the SLA.

FUTURE CONSIDERATIONS

Due to time limitations the following areas have not been addressed:

- NextG access at non dsl sites. The suitability of the NextG modems will have to be confirmed, this will need to address signal strength, antenna design, performance and stability. Standards investigation indicates that NextG theoretically supports an upload speed of 384 kbps whish should be sufficient to support adhoc (due to data limits / cost implications) site video monitoring;
- Kingston - Cape Jaffa wireless link. It is recommended that the NextG option be confirmed prior to investing in another communications technology. While possibly a better performing technology it has long term support implications (three different WAN technologies).