ISSN: 2277-9655
Impact Factor: 3.785

IJESRT

INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

NETWORK PERFORMANCE MONITORING USING THRESHOLD CROSSING ALERTS

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DOI: 10.5281/zenodo.51005

ABSTRACT

Threshold crossing alerts (TCAs) indicate to a management system that a management variable, associated with the state, performance or health of the network, has crossed a certain threshold. The timely detection of TCAs is essential to proactive management. This paper focuses on detecting TCAs for network-level variables, which are computed from device-level variables using aggregation functions, such as SUM, MAX, or AVERAGE. This paper proposes a methodology which could be managing the individual network elements deployed in the telecommunication network environment. This proposed system uses local thresholds and is adaptable to changes in network state and topology.

KEYWORD: TCA, Network Element (NE), Methodology, Performance, Aggregation.

INTRODUCTION

A network management system (NMS) is a set of hardware and/or software tools that allow an network administrator to supervise the individual components of a network within a larger network management framework. Network management system components assist with Network device discovery ,Network device monitoring , Network performance analysis, Intelligent notifications. It is used to organize, design, analyze and administer telecommunication and computer networks, so that a desired level of service is maintained at all times.The network management system works on FCAPS principle i.e, fault management,configuration management,accounting management ,performance management,security management.

The Optical Management System (OMS) software lets network administrator centralize multiple network management functions with one system. It helps simplify the SDH /SONET (synchronous digital hierarchy/ synchronous optical networking) and optical Ethernet transport network operations while enabling the evolution to next-generation, service-oriented networks. The Optical Management System helps to reduce operations complexity through remote and centralized Network Element (NE) administration.It also provides seamless, end-to-end optical network management of an entire transport network and reduces the need for manual intervention in managing global networks. Circuits can be provisioned from a single-seat management location, without complex manual provisioning tasks. It provides network management functions for optical transport networks. Optical network technology provides prodigious capacity to transport data. It has led to the development of optical network elements. These elements are based on the fact that majority of the traffic that enters the node is being routed through the node en-route to its destination as opposed to being destined to the node. Clients can access and monitor these network elements through OMS. Thus Element Management is handled.

NETWORK PERFORMANCE MONITORING

Performance management is focused on ensuring that network performance remains at acceptable levels. It enables the manager to prepare the network for the future, as well as to determine the efficiency of the current network, for example, in relation to the investments done to set it up. The network performance addresses the throughput, network response times, packet loss rates, link utilization, percentage utilization, error rates and so forth.

This information is usually gathered through the implementation of an SNMP management system, either actively monitored, or configured to alert administrators when performance move above or below predefined thresholds. SNMP is protocol used by manager in ordrr to communicate with the agent configured in network element. SNMP agent maintains a database known as Management Information Base(MIB) which contains the attributes of managed device,which is uniquely identified by object identifires(OIDs). SNMP manager makes use of this database in order to request for required information from the agent and later it translates the data as understandable by the NMS. Actively monitoring current network performance is an important step in identifying problems before they occur, as part of a proactive network management strategy. By collecting and analysing performance data, the network health can be monitored.Also, performance thresholds can be set in order to trigger an alarm. The alarm would be handled by the normal fault management process.Alarms vary depending upon the severity of the problem.

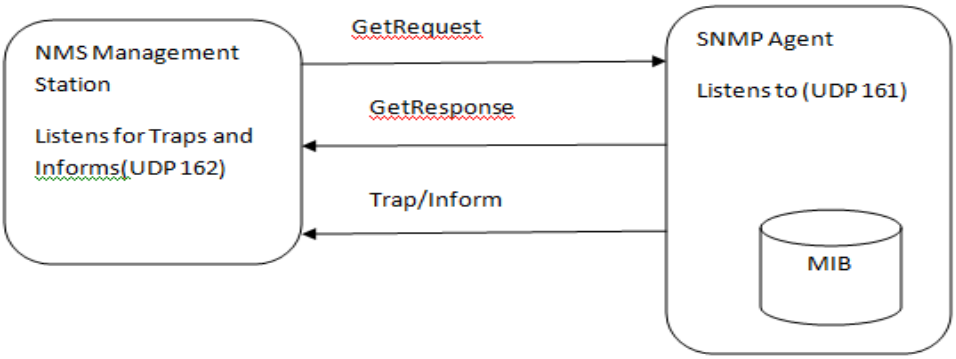

Fig1: SNMP exchange mechanism

THRESHOLD CROSSING ALERT

Threshold crossing alerts (TCAs) indicate to a management system that some monitored MIB object, or management variable, has crossed a certain preconfigured value – the threshold. Objects that are monitored for TCAs typically contain performance-related data, such as link utilization or packet drop rates. In order to avoid repeated TCAs in case the monitored variable oscillates, a threshold is typically accompanied by a second threshold called the hysteresis threshold, set to a lower value than the threshold itself. The hysteresis threshold must be crossed, in order to clear the TCA and allow a new TCA to be triggered when the threshold is crossed.TCAs represent an important mechanism in proactive management, as they allow for management that is event-based and does not need to rely as much on centralized polling.Today, TCAs are generally set up per device, e.g., for monitoring packet drop rates on a particular link. In addition, Service Level Agreements (SLAs) are often articulated similarly, on a per-device basis, reflecting the limitations of today's technology. However, there is a definitive need for management functionality that provides cross-device TCAs, which are applied to parameters that are aggregated across the network. Examples include management applications that alert an operator whenever (a) the average link utilization in a domain rises above certain threshold.

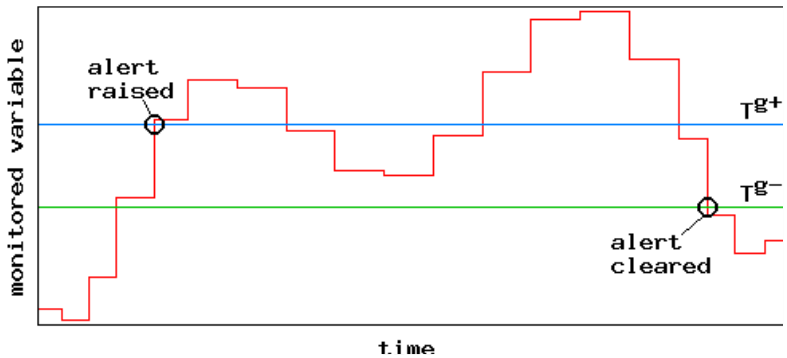

Fig 2 : An alert is raised when a monitored variable crosses a given threshold Tg+. The alert is cleared when the variable crosses a lower threshold Tg−.

ISSN: 2277-9655
Impact Factor: 3.785

THRESHOLD CROSSING ALERT METHODOLOGY

In the proposed methodology for TCA,there exists various performance counters like errored seconds(ES) that can be set by the network administrator.If the populated value for those counters exceeds the threshold set by the administrator,an alarm will be raised and it will be reported to the management interface. These performance counters for monitoring the network parameters will be based on 15-min and 24-hour basis.

Design Goals :

- The raise message shall be sent towards the management interface, if the raise threshold value (TR) for the PM register is crossed during the measurement period. The TCA shall be considered as active from this time on.
- If the raise threshold value does change for an active TCA, the TCA shall be not resent.
- The clear message shall be sent towards the management interface at the end of a measurement period if the clear threshold value (RTR) will be not crossed during this measurement period and the measurement period is not considered as adjusted or not available and the measurement period contains no Unavailable Time and the TCA is active for the PM register. From this time on the TCA shall be considered as inactive.
- The clear threshold value (RTR) should be always set with a lower value than raise threshold (TR).If the clear threshold (RTR) changes during the measurement period, always the provisioned clear threshold value at the end of the measurement period shall be considered for the decision if an active TCA becomes inactive or not and a clear message will be sent or not.
- If the raise threshold value will be set to zero, means TCA reporting will be switched off, then any active TCAs shall be cleared immediately without waiting until the completion of Next Interval.
- If for an active TCA the current register will be reset, nothing shall be done. The current measurement period is considered as suspect (VLDTY=ADJ). So at earliest after the next measurement period the TCA will be cleared.

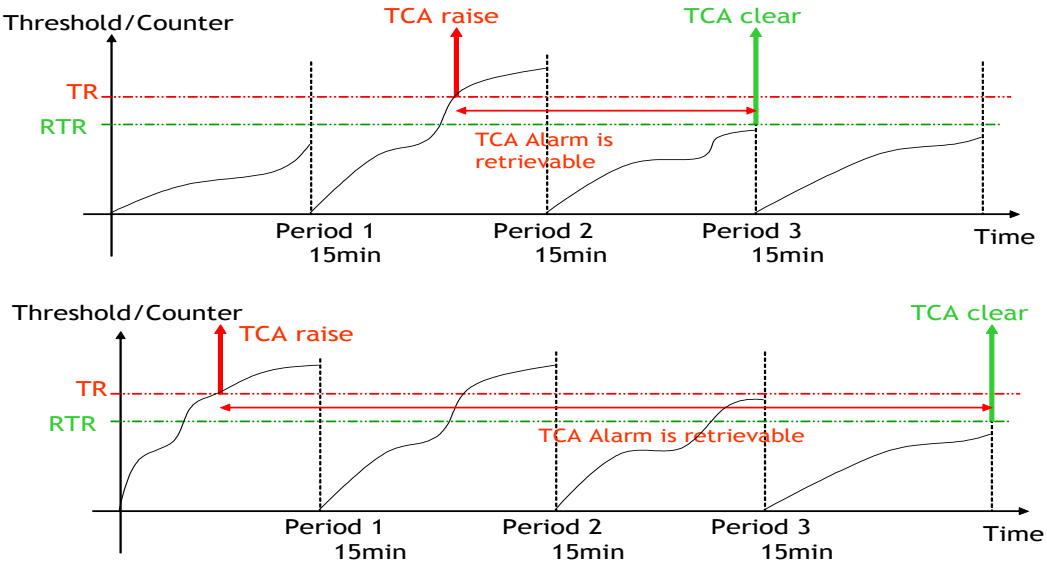

Fig 2.3 : TCA processing in cases of 15- min accumulation time periods

CONCLUSION

In this paper a methodology for Threshold Crossing Alert(TCA) is proposed which is used to raise alarms in the network elements . This proposed design can be used to manage large optical network and monitoring the performance level for the network elements deployed onsite. The network administrator need not to check individual

network device if any fault occurs due to threshold crossing set by the administrator himself. The future work of this system is to reduce the processing time for raising and clearing the TCA.

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